The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Good Lighting

ALWAYS a matter of importance, and often a problem presenting considerable difficulties, the question of adequate lighting to-day has assumed even more imposing dimensions. Precautions taken to comply with black-out regulations have in many cases resulted in partial or total obscuration of natural daylight, so that the disposition of artificial light in factories has tended to become an all-day consideration instead of a part-time problem. It is a healthy sign that a good deal of ink has been spilt in dealing with this question of lighting. A small book, entitled "Modern Factory Lighting," has just been issued jointly by the British Electrical Development Association and the E.L.M.A. Lighting Service Bureau, while even in the United States, where black-out problems do not, of course, apply, a report on the Lighting of Chemical Plants is included in last month's issue of *Chemical and Metallurgical Engineering*. To-day we are not dealing with the special problems raised by the black-out regulations, as this matter was gone into at some length in our issue of December 23 last. The question of every-day lighting in itself provides quite enough material for discussion.

The great point is, of course, that the human eye is intrinsically the most important, and in many ways one of the most delicate instruments concerned in any manufacturing process. For all its lack of mechanical accuracy, it is the most essential control device that industry possesses; and practical politics, not to speak of common humanity, demands that it be given the most favourable working conditions. How these conditions are to be provided has been the chief preoccupation of lighting engineers ever since types of illumination less primitive than the candle have been in common use. As the American journal says: "Good lighting is a paying investment, not a needless luxury." Of late years enormous advances have been made in the standards of lighting; in addition to demanding a high level of uniform illumination for ordinary general purposes, modern factory practice requires special light for special occasions, and lamps to suit various purposes have accordingly been devised as a result of recent research. In addition to the tungsten filament gas-filled lamps which have long been in general use, electric discharge lamps—either the argon-mercury type or the neon-sodium type—are now available; and special forms of light source, emitting fluorescent, polarised, ultra-violet, or infra-red light, can be installed for specific industrial purposes.

When, owing to the nature of the work, intensity of illumination is the prime consideration, it is obvious that this factor must vary in accordance with the degree of precision involved in the work in hand. Intensity of light may vary from a minimum of 4 foot-candles, when simple work involving no attention to details is concerned, to more than 50 foot-candles when it is a matter of high-precision operations requiring rapid discrimination and the quick appreciation of minute details. In fact, the one hard and fast rule to take note of is that *no* hard and fast rule should be universally applied. For the ordinary operations of chemical engineering, for example, a strength of from 5 to 10 foot-candles is sufficient; in moulding, enamelling, and the like, however, this factor should be raised to about 12, while in the machine-shop from 10 to 35 foot-candles may be necessary according to the fineness of the tasks in hand. It is quite obvious, of course, that other factors will come into play that are of equal importance, such as the positioning of the lamps, the type of fitting employed, and the colour of the walls and ceiling. Methods of arriving at the optimum standard in all these directions have been worked out by the various Associations concerned with lighting, and it is not our province to detail them here, but merely to insist on the advantages to be gained by following them.

A word, however, may be said on the special problems involved in the lighting of chemical plant. Certain operations connected with the chemical industry are fraught with danger and necessitate dust-proof and explosion-proof lighting fixtures. Special fixtures have been designed for use in working with special materials, and a very important consideration in this respect is that the general illumination should be sufficiently good to obviate the necessity of using portable lights, owing to the difficulty of enclosing the latter in the requisite safety fixture. Mounts should be rigid and not flexible and reasonably substantial metal guards should be provided.

"What the eye don't see, the heart don't grieve after" is all very well as a motto for culinary chemistry, but in the more delicate operations of industrial chemistry it is a very dangerous principle to follow. The human eye is often the ultimate judge of the success of an operation or the quality of a product, and it is of the highest importance that in industry it should receive the careful consideration that so vital an instrument deserves.

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NOTES AND COMMENTS

Carbon Monoxide Detection

THE D.S.I.R. has issued a further leaflet in the series "Methods for the Detection of Toxic Gases in Industry" dealing with carbon monoxide. (Leaflet No. 7, H.M. Stationery Office, 1s. 6d. net.) Among the industrial situations in which this gas may be encountered in dangerous concentrations are blast furnaces, brick kilns, chemical works, foundries, gas works, coke ovens and lime kilns. An atmosphere in which a concentration as low as 1 part in 2,000 is present may prove fatal in about one hour to a person engaged in an active occupation. On the other hand concentrations below 1 in 10,000 may be regarded as relatively harmless for all practical purposes. The standard method developed for the detection of carbon monoxide in industry consists in drawing samples of the atmosphere under test through a known area of test paper treated with palladium chloride, at a slow and constant rate, by means of a 5-litre aspirator. This method enables interfering gases to be removed by allowing the sample first to pass through a tube of activated charcoal. Sampling is continued until a stain is obtained on the test paper which compares with the standard colour chart; the concentration present is then determined by comparing the time required to reach the necessary colour with the times given on the chart. In this way concentrations of 1 part in 500 can be detected in less than two minutes, and of 1 part in 10,000 in half an hour. Full instructions and the colour chart are contained in the leaflet.

Heat Treatment of Glass

THE effect of heat treatment on the colour of gold ruby glass has been studied by Badger, Weyl, and Rudow (Glass Industry, 1939, *20*, 11, 407-414). A series of soda-lime-silica and potash-lead-silica glasses containing the usual amount of gold were melted up and then heated for nine hours at temperatures between 450 and 750° C., to develop the ruby colour. The richest rubies were obtained with the potash-lead-silica glasses; it was also found that the presence of alumina in the melt required a higher temperature for the production of a ruby of the same depth of colour as in its absence, probably owing to the higher viscosity of alumina-containing glass. Samples of a gold-treated commercial soda-lime-silica glass were heated at various temperatures between 575 and 1000° C. for varying periods. At 575-650° C. the colour developed was purple. At 650-750° C., a ruby colour was obtained, whilst at the highest temperatures, about 750° C., the glass was livery by reflected, and blue by transmitted, light. Absorption curves for the various glasses were obtained, which should provide a scientific basis for the processing of these glasses to get any desired colour. It is considered that the explanation of the observed phenomena is that when a quenched colourless gold-containing glass is heated near the softening point, the aurous compounds decompose with the formation of auric ions and metallic gold, the amount of the latter being higher if reducing agents such as stannous ions are present. At the lower temperatures this gold forms in trees (purple colours) as found in nature, a form which at slightly higher temperatures breaks up into more symmetric forms (ruby colour). At higher temperatures still, aggregation of these gold crystallites occurs, with the development of a blue colour.

Chemotherapy

THE origin and action of drugs were among the subjects discussed by Sir Walter Langdon-Brown in an able address delivered recently at a meeting of the Pharmaceutical Society. The address (reported in *The Pharmaceutical Journal,* February 17), was entitled "How Do Drugs Act?" and in it Sir Walter suggested that it was probable that drugs were first given as a form of sympathetic magic. His pertinent comment was that to squeeze heart muscle into a tablet and call it cardin was no advance on the savage who ate his opponent's heart to give him courage. He went on to say that when he read in a herbalist pamphlet that the herbs provided by Nature maintained physical health because they were grown in the sunshine, he wondered whether that would be a consoling reflection to a man in the convulsive torments of strychnine poisoning. He failed to see why vegetable drugs were the most "natural" for animals. Surely the most natural drugs for animals were those produced by their own bodies, the hormones and antitoxins. It was unintelligible to him why such products should be called filthy and herbal remedies natural. They might, however, join hands with the herbalist in marvelling at the apparent ease with which plants could manufacture potent alkaloids, only some of which could be imitated, and those laboriously, in the laboratory. Nor did they know what use the plant made of such alkaloids for its own metabolism. The use of some drugs was entirely empirical, and in some instances the scientific explanation was not yet reached. In other instances the rationale had only been discovered after a long interval. He was therefore constrained to utter a plea for empiricism, especially as he still remembered the scorn of the pharmacologist for the clinical belief in cod-liver oil before vitamins were discovered.

Chivalry in Business

AS business is often given a bad name by writers and novelists, it is pleasant to read a tribute from Lady Fortescue, in her latest book "There's Rosemary, There's Rue." "Everywhere in the trade," she writes, "I found kindness and chivalry. Always I was treated with the utmost consideration, deference and respect."

SOAPS IN THE RUBBER INDUSTRY

The Evaluation of Lubricants : Zinc Salts in Compounding

By

T. L. GARNER, M.Sc., F.I.R.I.

IN discussing the use of soaps in the rubber industry, and accepting the term as covering the range of fatty acid salts, a wide field of applications must be considered. One of the most important, however, is the use of the ordinary sodium or potassium soaps as lubricants during the actual moulding of rubber articles. There are, of course, other materials which have been used more or less successfully as lubricants, the most important of these being French chalk and sugar solutions, although a wide range of proprietary products of varying composition has been made use of.

French chalk possesses many serious disadvantages. It is applied usually by dusting from a cloth bag and cannot be prevented from flying about to a considerable extent and settling again where its presence is not required, and where it may be definitely harmful, for example on articles being made up in other sections. Further, while it is undoubtedly a good lubricant, it does not give a good finish on rubber goods and also assists in flex-cracking of the vulcanised material. In common with sugar solutions, it also causes moulds to become rapidly dirty; the latter solutions also are effective only at relatively high concentrations.

Soap solutions are very satisfactory lubricants, but if applied by brush, as is the practice in some small factories, they cannot be applied evenly and, as a result, moulds require more frequent cleaning than they should. The only satisfactory method of lubricating moulds with soap solution is to make up the solution correctly to specified strength and feed it at high pressure through pipe-lines to the moulding shop where each operator is supplied with a spray gun. Each mould can then be sprayed evenly with the correct amount of soap, and contamination by operators is impossible.

The evaluation of suitable soaps for use as lubricants is not an easy matter, since there has been no particular study of what exactly constitutes a good lubricant and consequently there is no published literature to refer to. There are no satisfactory laboratory tests to decide the matter, and ultimate reliance must be placed on reports from operators and factory foremen working lines of production presses. Such reports are of little value because individual prejudices will often cause a completely erroneous report to be made; it is not unknown even for an entirely different report to be made on the same solution of lubricant by different operators, and also by the same operator at different times.

In conjunction with an estimation of the lubricating value of a soap solution there are other factors to consider. With the increasing use of aluminium and its alloys for the manufacture of moulds, the use of a soap containing free alkali is obviously unsatisfactory and may lead to porosity of the mould surface and consequent poor finish; the use of any alkali for mould cleaning is also impossible in such cases.

A series of experiments on soaps carried out by the writer under carefully controlled conditions, using sodium and potassium stearite and oleate soaps in distilled water solution, showed that the harder soaps were much more effective than the soft ones at the low concentration which it is desirable to use if moulds are to remain clean for a reasonable period. There is a very great need, however, for a more exact method of evaluating lubricants, preferably under laboratory test conditions, in order to determine exactly all the points which collectively make up a good lubricant.

One point that must be carefully guarded against, especially when using soap solutions in pressure pipe lines, is their tendency to gel on standing. Strengths normally used in the rubber industry vary from 1.5 to 4 per cent. and many soaps submitted as suitable lubricant types will gel at these concentrations on standing overnight at room temperatures, say 60° to 65° F. This tendency can be overcome by the use of cyclohexanol in correct proportion. Using a 2.5 per cent. soap-flake solution and varying the amount of cyclohexanol added, the following results were obtained:—

% Cyclohexanol.	Observation.
Nil	Uniform gel after 2 hours.
0.05	,, ,, ,, ,, ,,
0.25	Considerable gelling overnight.
0.5	Slight precipitate after standing 30 hours, but no gelling.
1.0	Very slight precipitate after 30 hours.

From these figures 0.5 per cent. of cyclohexanol was standardised and proved perfectly satisfactory. It must be borne in mind, however, that the rate of gel formation varies considerably with temperature and if lower temperatures are encountered, then a higher percentage may be necessary.

The cloths used in a rubber factory to separate unvulcanised rubber sheets or proofing and yet maintain a tacky surface require special treatment in many cases if trouble is not to be experienced owing to the rubber adhering to the liner cloth. Spreading the liner with several coats of a soap solution and drying out between each will give a surface sufficiently resistant to sticking for some purposes, but for heavy work, such as, for example, tyre fabric linings which may be hundreds of yards in length, better treatment is necessary. A suitable treatment in such cases can be prepared from cellulose acetate dope and linseed oil, using soap to form an emulsion of the mixture so that it can be conveniently spread on to the fabric in the ordinary spreading machine. Castor oil and camphor can be added to soften the preparation, two typical formulæ being:—

Cellulose acetate	10 lbs.	Cellulose acetate	10 lbs.
Boiled linseed oil	20 lbs.	Boiled linseed oil	18 lbs.
Acetone	10 gals.	Castor oil	2 lbs.
Soap	1 lb.	Camphor	2 lbs.
		Acetone	10 gals.
		Soap	1 lb.

The soap is dissolved in a little water, the oils emulsified with it, and the mixture added, with stirring, to the solution of acetate in acetone.

Soaps in Rubber Compounding

Zinc salts of fatty acids are particularly favoured as dispersing agents for rubber compounding ingredients during the mixing process. Of these, zinc stearate and zinc oleate were among the first to be used and the former also, because it could be ground to a fine powder, has retained popularity as dusting agent for rubber sheets to prevent them adhering It is particularly valuable in this connection since, unlike French chalk, it melts when the rubber is warmed and dissolves in the rubber during vulcanisation. There is thus no possibility of defective joints, folds and so on, such as occur at times when excessive French chalk is used.

Stearic acid itself is a valuable and widely used softener for rubber, but the zinc salt is less efficient. On the other hand, the zinc salts of the fatty acids from coconut oil, principally lauric acid, are particularly useful as dispersing agents and softeners. They possess the advantage, in common with all the zinc salts over the corresponding free fatty acids, of not blooming to the surface of unvulcanised rubber and leaving there a greasy film. This latter makes it difficult at times to secure good adhesion between stocks unless they are carefully cleaned. At the same time the zinc salts are more expensive than the corresponding acids and their use can be justified only where the advantages on the lines indicated above are sufficient to warrant the higher costs.

CARBONISATION OF COAL

Rich Source of War Material at Beckton

A VISIT to Beckton gasworks, London, last week, provided a party of journalists and Government officials with a striking example of how coal, Britain's principal raw material, is, by carbonisation, serving as a rich source of war materials of vital importance at the present time.

There is no more wasteful or inefficient way of utilising coal than by burning it merely for its heat. War emphasises the high cost of inefficiency and waste in the use of essential raw materials and for this reason the processes of carbonisation, winning as they do numerous products from coal, are of especial value in war-time.

Carbonising one ton of coal, instead of using it in the raw state, makes available to the nation, in addition to 15,000 cubic feet of gas and 10 cwt. of coke, 25 lb. of sulphate of ammonia, 4 lb. of sulphur in addition to that required for the manufacture of sulphate of ammonia, 3 lb. of toluene for explosives manufacture, 2½ gallons of benzol for use as motor spirit, and 10 gallons of tar for repair of roads, for use as fuel or for distillation into numerous other materials. That which is produced at Beckton is multiplied 30-fold by the gas and coking industries throughout the country which carbonise 40 million tons of coal a year in peace time.

The production of toluene, ammonia and sulphur, of manifest importance at the present time, is receiving the active assistance of the Ministry of Supply, whose endeavour it is to improve the quality of what is produced as well as to increase home production through carbonisation. So far as ammonia is concerned carbonisation plays an important part by supplying a secondary source of supply for agricultural needs and enabling the main source of supply from "synthetic" factories to be devoted entirely to the manufacture of nitric acid and ammonium nitrate for explosives. Similarly, the carbonisation industry in this country is now the principal source of supplies of toluene required for explosives, and has enabled a larger proportion of sulphur to be produced at home than was possible during the last war.

To the visitors inspecting the works these facts and many others were significant reminders of the importance of carbonisation; if indeed any such reminders were needed. The magnitude of the operations were obvious even to the most lay-minded—a pulsating example of the industrial might of Britain.

Benzol Distillation

The itinerary of the tour included a visit to the retort house where the basic process of the carbonisation takes place in a battery of 300 retorts (a similar process, though on a much larger scale, was seen at the coke ovens); the benzol recovery plant where the final stage in the extraction of valuable products from the gas takes place; the benzol refining plant where the crude benzol is distilled to make pure benzol for motor transport and aviation and a basis for dyes, pure toluol for explosives, pure xylol for spray paints and aeroplane finishes, naphtha for camouflage and other paints, and carbon bisulphide for the rubber and artificial silk industries; the tar distillation paint where the crude tar, already extracted from the gas, is treated by a continuous process to yield light oils, carbolic oil, creosote and pitch; and the products works laboratory where a simple exhibition was seen of the primary materials and the worked-up finished products obtained from coal by carbonisation and the purification of gas.

At a luncheon which followed the inspection of the works Sir David Milne-Watson, Governor of the Gas Light and Coke Co., stressed the importance of gas undertakings in the war effort and stated that during the last war one gas undertaking alone supplied enough T.N.T. and other explosives to fill 160 million shells, 17 million gallons of oil, 13,000 tons of disinfectants and enough tar to treat all the military roads on the Western Front. What they did in the last war, the gas industry was ready to do to-day. Owing to great improvements in technical methods of manufacture, the thermal efficiency of carbonisation had increased from 70 to 85 per cent. With those developments had come a corresponding improvement in the efficiency of by-product recovery. Almost as much benzol could now be produced in a year as was produced by gasworks between 1914 and 1918.

Mr. Burgin, Minister of Supply, who also spoke, referred to the remarkable manner in which, with the aid of science, a great commercial undertaking of national importance was handling and turning to good account Britain's greatest raw material. Coal, an essential raw material, possessed by this country in abundance, had under their eyes been handled in these great works to maximum advantage, and every ounce, every gramme of value extracted from it and turned to good use in the nation's interests. The steel output of the Empire was to-day double that of 1914. The Empire output of essential metals—copper, lead, aluminium, was far more than doubled. How rich, then, we were in material. How much the greater the need to see that it was utilised to maximum advantage. Figures of money spent, of orders placed, conveyed little idea of the immensity of the need. Our motto must be to harness the totality of the nation's resources.

NEW DISINFECTANT SYSTEM

A French chemist, J. Risler, has made some very successful experiments with a disinfectant of a new type, using a mixture of two substances, one a rapid acting powerful disinfectant and the other a less powerful slow acting substance. Testing the bactericidal power of such a mixture he has discovered that to begin with this decreases to a certain point, but then increases, to reach a stable disinfectant strength which, in the case of mixtures of thymol and terpinol, for example, may last four years. Risler prefers, however, mixtures in which the two components are representative of different chemical functions: e.g., an acid with an aldehyde or a phenol. These produce a polyvalent bactericide which is fast and active. Sometimes also, when sprayed into the air, it seems to increase the resistance to disease of those who breath it. Tests made with a mixture of equal parts of methyl-3-isopropylphenol and methylisopropyl-4-cyclohexene showed this. The mixture was sprayed into the air of a room in which paratyphoid germs were also sprayed, and succeeded not only in protecting guinea pigs against the germs but also against the disease when, after 45 days, the paratyphoid germs were injected into them. This new type of disinfectant is being examined with great interest in France.

ACTION OF CHLORINE OF CALCIUM OXIDE

In a note to the Academy of Sciences, Paris, Marcel Lemarchands and Ernesto Matiz Umana report on experiments as to the action of chlorine on calcium oxide. When both are anhydrous, the combination is only superficial and the attack of the chlorine on the oxide ceases as soon as the surface is covered with calcium chloride. The presence of water seems to overcome the inertia. Various experiments as to the mechanism of the combination showed that pure chloride acts less rapidly on calcium oxide, and produces a greater quantity of heat during the reaction, than dilute chlorine. As the temperature goes up, moreover, the absorption of water by the calcium chloride increases. When the reaction takes place at higher temperatures, therefore, more moisture is required to overcome the inertia than is the case when the combination takes place at low temperatures.

THE LATEST ENTERPRISE of the chemical industry in Palestine on the industrial side is the manufacture of alcohol from the Jaffa orange, for which a new factory has just been set up. From the residue of the fruit, too, cattle fodder and fertiliser will be made at this factory.

BRITISH CHEMICAL PLANT MANUFACTURE

Discussion by Chemical Engineering Group

LAST week's meeting of the Chemical Engineering Group of the Society of Chemical Industry, which was held in the rooms of the Chemical Society, Burlington House, London, following the luncheon of the Group at a neighbouring restaurant, led up to an animated discussion on the British chemical plant industry. DR. G. E. FOXWELL and MR. B. N. REAVELL presented in summary form their paper on "The Chemical Plant Manufacturer in relation to Chemical Industry," which was recently published in "Chemistry and Industry."

Mr. Reavell read extracts from the paper, in which he stressed the necessity of a strong chemical plant industry in this country to exist parallel with other similar branches of industry. British chemical plant manufacturers, he said, might be classed under three heads: (1) Firms manufacturing plant to the general designs of their clients; (2) manufacturers of specialities for unit processes taking complete responsibility for the workability of their products; (3) manufacturers of complete plant for any given process, who relied on their intimate knowledge of the industry, and also undertook complete responsibility for their products.

Mr. Reavell argued that the difference between British manufacturers and their foreign competitors was that the former were generally unable to offer plant for complete processes, and that the foreigners, in fact, had greater facilities for making general quotations. For fifty years, he said, the British chemical industry has been purchasing plant from abroad, especially from Germany and the United States. Up to the beginning of the last war German chemical plant manufacturers enjoyed almost unrivalled prestige.

The principal complaints levelled against chemical plant manufacturers in this country were: (1) that while it was seldom possible to get them to quote for complete processes, it was frequently possible to get foreign manufacturers to guarantee results; (2) British manufacturers were averse to experiment, and it seemed just to demand more initiative from them; (3) British manufacturers lacked experienced chemical knowledge among their staff, as well as facilities for manufacture. There was a demand in the plant industry for a few real specialists. As a result of this lack, some chemical manufacturers actually preferred to design and even manufacture their own plant.

Plant Manufacturers' Complaint

In answer to this, the chemical plant manufacturers say that it is unreasonable to expect them to make a quotation for any complete processes—probably involving very considerable expenditure of time and money on research—without the assurance of subsequent demand; and that they cannot be expected to develop plant for new processes when these are likely to be only in rare demand. They have to consider the cost and the return on their outlay, and of the last they can only have a limited expectation, on account of their limited share of the world market. The plant manufacturers argue that their position has been aggravated by the preference of British chemical manufacturers for German or American plant, and they ask whether the British chemical industry is likely to be disposed to co-operate with the plant industry. Some processes require elaborate experimental work for the designing of plant to suit them; this could be done by firms in "group 3," but is a task impossible for them to undertake unless they are recompensed either in cash or by sales. Furthermore, the chemical manufacturer is loath to give information on the working of such plant when it has once been installed. It does not seem unreasonable to ask, therefore, how an improvement of the situation can be affected; nor is it unfair to require that, in the question of plant manufacture, guarantees must be two-sided. The chemical manufacturer must give a guarantee of the quality of his products. In order that the British chemical plant industry may take its legitimate place in the world, it would seem that some combination of manufacturers was necessary to increase the amount of co-operative knowledge. Another step towards this end would be the creation of panels of consultants. The lecturers could offer no other solution, and asked for the assistance of their audience in this matter.

Mr. Reavell ended his paper by a series of questions:

(1) Should plant manufacturers co-operate by means of a central office? (2) Should plant manufacturers and chemical manufacturers pool their knowledge, as had been done in the coke-oven industry, and if so, how could this knowledge be made available? (3) Could consulting chemists become the nucleus of a new organisation of the kind indicated? He thought it might be wise for them to combine before their occupation as consultants vanished.

Since the paper was written, Mr. Reavell had spoken to an ex-director of an Austro-German chemical engineering firm, who said that while he was still in Austria it had been decided that on account of the money lost in preparing quotations, they would only quote for process plant of which they had practical experience. The policy dictated by the Nazi Government had been never to turn down any inquiry.

Opening of the Discussion

MR. H. W. CREMER, from the Chair, in inviting comment from the audience, declared that he felt Messrs. Reavell and Foxwell's paper seemed to connote an impression of suspicion and lack of co-operation in the chemical plant world, and he would like to feel that this atmosphere could be dispelled.

MR. W. EDMUND EVANS, speaking as a consultant, said that it was desirable more than ever now to strengthen the British chemical plant industry. There was nothing intrinsically superior in German designs, which, on examination, were often open to severe criticism. As a first step he suggested that firms in Mr. Reavell's "group 2" should work in concert with the aid of a panel of consultants. The consultant should act as a co-ordinator to link together unit processes. By such means it might be feasible to divide the cost of preparing designs for plant among various firms.

MR. H. V. POTTER, as a purchaser of chemical plant, criticised Mr. Reavell's statement that the field for the British chemical industry was restricted. After all, they had the whole of the British Empire as a field for expansion. He claimed that the chemical plant industry should put its house in order; that they should spend more money on research, and not require to be told by the purchaser of chemical plant what he wanted.

MR. HUGH GRIFFITHS confessed himself as being principally responsible for introducing German chemical plant into this country, and he accused the British chemical manufacturer and chemical plant manufacturer of not really knowing their jobs. German firms, he said, worked very hard to make money out of chemical plant, but they did not, as a rule, give quotations for plant for complete processes. What happened was that inquiries were passed on from hand to hand until they reached the right man. In the event of it being required to design a really big complete plant, e.g., for synthetic ammonia, the German plant manufacturers demanded money down first. He pointed out that some of the demands for buying chemical plant on a large scale that had been made amounted practically to buying a new business, and that no plant manufacturer could be expected to provide plant on such a scale without actually having a share in the new business. A great many quotations were actually unnecessary, and a great deal of trouble could be saved if plant manufacturers would not poach on each other's preserves, but instead would pass on quotations to firms competent to deal with them. This was the method that had been adopted in

Germany, and this, he contended, was the proper spirit.

MR. R. F. STEWART referred to the overseas market and gave it as his opinion that our methods of dealing with this market are wrong. In his view to quote for complete plant was a waste of money and time because of the difficulty of tuning in a plant to work as an organic whole. Every individual portion of the plant might work perfectly, but yet the whole plant reveal unsuspected difficulties. His conclusion was that the plant should be dealt with on a cost percentage basis and that the foreign purchaser should undertake the solution of operating difficulties. He emphasised that the methods of dealing with Eastern customers must be different from those in dealing with Western customers.

MR. M. B. DONALD stated that there seemed to be no way of discovering who could deal with any specific inquiries and even the B.C.P.M.A. organisation was incomplete in this respect. It was, for example, very difficult to discover what firm could quote for complete plant for making even the simplest chemical.

Position of Chemical Engineers

MR. WILLIAM C. PECK was of the opinion that German firms had a better appreciation of the problems of chemical processes, a fact which he ascribed to their greater operating experience. He regretted that plant operation was not dealt with in the paper since the design of a plant must be based upon operating experience. A very important factor, moreover, was the support given to chemical engineering training. German, and particularly American, firms supported this much more than we did in this country and the position of the professed chemical engineer was very much weaker here than in other countries that have a stronger chemical engineering profession.

MR. R. J. LOWE said he felt that the desire to erect complete plants for the foreign market was an imperialistic dream of the plant manufacturer. He pointed to the difficulty that confronted any chemical manufacturer in disclosing his processes in that by so doing he would assist his competitors to manufacture for his market. In these circumstances he asked how the chemical manufacturer could take the plant manufacturer fully into his confidence when installing new plant for a new process. The coke-oven and gas industries, who have been mentioned in this connection, were in an altogether different position because they had a statutory area in which there was no competition from other similar firms. Mr. Lowe complained that firms who professed to build the plants did not always make the complete plant themselves, but put a good deal of work out to others. He instanced the many operations required in making, for example, an electric bulb and inquired how it was possible to ask any one firm to supply all the numerous portions of plant that were required for a complete operation. Our marketing methods were wrong for abroad because makers' catalogues generally asked the buyer to write for particulars instead of quoting prices in the catalogues as they generally did some 40 years ago. He complained, moreover, that manufacturers did not give guarantees as much as they should do.

MR. F. L. GORDON (United Steel) emphasised that chemical manufacturers should set out to make their own designs so that they would have something original to sell. He thought it would be well to make a consortium of all chemical plant manufacturers able to quote for the complete plant. In particular he felt that the authors ought to have included yet another group which, to be logical, should precede the groups that had been given in the paper. This group, which he termed "group 0," should comprise suppliers of materials whether metals, clay products, silica, or other matter, from which chemical plant was made. These firms had very highly developed scientific staffs whose duty it was to advise purchasers in the use of their materials, and these firms could and did give very useful assistance to firms in groups 1, 2 and 3.

MR. E. F. MACTAGGART said that some 90 per cent. of the chemical plant dealt with by British manufacturers consisted of specialities which were not invented in this country and for which a royalty was paid to foreign patentees. This caused the prices to be very much higher than they otherwise would be. The speaker complained that quotations were frequently incomplete in that certain items were omitted, the purchaser being left to buy them elsewhere for himself. He emphasised that results could not be guaranteed unless the profits were sufficiently high to enable any financial loss involved in giving the guarantee to be borne.

The Authors' Reply

DR. FOXWELL, replying, said that he felt that the discussion had proved highly profitable and would be of considerable value to chemical plant manufacturers. The paper had arisen as a result of discussions held by members of the B.C.P.M.A. and had been put forward in the hope of getting wider criticism and ideas; in that he felt they had been successful.

Referring to the points brought out in the debate, he felt that a very important question had been raised in regard to sales organisation. Chemical plant manufacturers receive many "dud" inquiries from abroad and did not receive as many sound inquiries as they would have liked. He thought that the sorting out of the "dud" inquiries and the obtaining of the good inquiries could only be satisfactorily solved by strong local agents. Mr. Evans had recommended a consulting panel, but had still not indicated how that panel was to be paid by a manufacturer who probably got less than one order for every ten quotations made. It had been suggested, particularly by Mr. Potter, that the plant manufacturer must keep ahead of his clients, but Dr. Foxwell asked how this could be done in view of the fact that the plant manufacturer was generally not allowed to keep in touch with his plant after it had been put to work, and had not the same opportunities of making improvements as did those who were operating it. This was particularly difficult when a plant was only called for rarely; if a manufacturer was to specialise in a plant to the extent of keeping ahead of those who were operating it he must have a considerable market for his plant, and this could only be done if the process was such as to cause the constant demand for new plants either at home or overseas. Mr. Potter had asked whether the British chemical plant industry was really circumscribed in view of the fact that they had the whole of the British Empire at their disposal, but it must be remembered that purchasers of the British Empire do not come to this country regularly for their plant, for instance in the case of Canada which, being close to the U.S.A., generally obtained its specialist plant for chemical works, for gasworks and for coke ovens from that country.

Nazi Government Subsidies

Dr. Foxwell congratulated Mr. Griffiths on his remarks which he felt were exceedingly helpful though he could adduce instances in which German orders for engineering plants had undoubtedly been obtained by direct subsidy from the Nazi Government. He congratulated Mr. Griffiths on debunking the German chemical plant industry even though perhaps he had not shown us how to build our own industry up to the same extent. In reply to Mr. Donald, Dr. Foxwell maintained that the B.C.P.M.A. were really doing a vast amount of good work even though it sometimes happened that their members were unable to deal with certain specific inquiries. Very often in these cases it was equally difficult to find a consultant who could be of assistance.

Mr. Peck had raised an important point in the greater operating experience of German firms and that was, in effect, one of the major complaints that the plant manufacturer had to make against the chemical manufacturer. In many other industries the plant manufacturer was asked to operate a plant until guarantees had been secured and was then encouraged to come back at fairly frequent intervals to see how his plant was working and to discuss any difficulties that might arise. It was a great handicap to the chemical plant

manufacturer that that was not the practice in the chemical industry. He agreed that among British engineering firms in general support for the training of chemical engineers had been lacking, but there were signs of an improvement in that direction. In reply to Mr. Lowe the speaker said that although gas companies had their statutory areas, coke-oven firms had not, and they had to sell in competition with one another. Formerly there was secrecy as there is now in the chemical works, but during the last 20 years this had all been swept away. He could not understand Mr. Lowe's complaint that firms sometimes put their work out. If a firm was expected to undertake to build a complete plant it would inevitably happen that they would have to go to sub-contractors for certain items which they did not manufacture for themselves. How many firms who made platework, for example, could make compressors, pumps or electric motors?

He agreed that it would be very useful if catalogues could include prices, but in the intervening 40 years since that was done markets had so changed that one could no longer rely on the prices of materials remaining stable over even a short period. He hoped that Mr. Gordon would follow out his suggestion to its logical conclusion and would join the B.C.P.M.A. Mr. Gordon replied that the United Steel Company had already done so. Dr. Foxwell then said that he was sure that Mr. Gordon would realise in that event how greatly the members of the B.C.P.M.A. welcomed the co-operation of the manufacturer of the materials used in making plant. He agreed that a fourth group could very well have been included, but said they were not included because they were not direct manufacturers of finished chemical plant.

Replying to Mr. Mactaggart, Dr. Foxwell said that he did not agree that it was a disadvantage for firms in this country to handle foreign inventions. These inventions had to be sold in competition with plant produced at home and if these had advantages they would sell in spite of the higher price. The ultimate result was that the patent and the licence expired after a period of years with the result that another industry or manufacture was added to our repertory. In any event, by taking out a licence for a foreign patent the manufacturer could ensure that the article was made in this country. The reason why quotations were sometimes not complete was that by offering on occasion to supply something which he did not himself make the manufacturer had to include a handling charge plus the manufacturer's profit and, being honest, and anxious to do the best for his client, he suggested that it would be better if the latter could obtain it direct.

In conclusion Dr. Foxwell expressed his view that those who had taken part in the debate must be congratulated upon the value of their contributions. MR. REAVELL, in reply to one or two additional points, referred to Mr. Lowe's difficulty of the possible loss which a chemical manufacturer might sustain by disclosing his process to the plant manufacturer. A simple method of dealing with this was that the plant manufacturer could undertake to keep the process secret for a mutually determined period by end of which time he could then use his knowledge and the chemical manufacturer would thus have obtained a great enough start to keep ahead of competitors. If this procedure were not followed the plant manufacturer would have to put the whole of his overheads and the cost of his experimental work on to this one plant with the result that the chemical manufacturer would have to pay very much more for his installation.

Protection of Chrome Dyes

The Influence of Iron Segregators

METHODS of preventing the development of dull shades when dyeing cloth with chrome dyes in the presence of small quantities of iron, is described by Bird and Molloy (J. Soc. Dyers and Colorists, 1939, *55*, 11, 560-564).

Chrome dyes are normally very sensitive to quantities of iron of the order of 1 p.p.m., which precipitate an iron lake that entirely alters the natural colour of the dye. The influence of a number of iron " segregators " on the dyeing behaviour of two dyes—Eriochrome Verdone S and Solochrome Dark Blue BS (Colour Index Nos. 292 and 202)—was studied under normal dyeing conditions. The compounds used were Calgon T (a mixture of 80 per cent. sodium hexametaphosphate and 20 per cent. sodium tripolyphosphate), acid sodium pyrophosphate ($Na_2H_2P_2O_7$), Trylon B (an organic product from I.G.), tetrasodium pyrophosphate ($Na_4O_2O_7$), and sodium tripolyphosphate ($Na_5P_3O_{10}$). The colours of the dyed cloths were compared in a Lovibond tintometer, and it was found that in the case of Eriochrome only the value of the red component was affected by iron. When dyeing was carried out in water containing 1 p.p.m. of iron the order of efficiency of the various agents in preventing a change in the red component was Trylon B $> Na_2H_2P_2O_7 > Na_4P_2O_7 >$ Calgon T $> Na_5P_3O_{10}$.

The amount of protective agent necessary could be reduced by dyeing by Goodall's method, in which dyeing is commenced at the boil, the liquor cooled for 10 minutes, then boiled for an hour, after which 0.5 per cent. of $K_2Cr_2O_7$ is added and boiling continued for a further half hour. The initial and final *p*H's are 9.3-9.7 and 6.7-7.0. Even with 2 p.p.m. of Fe in the bath, only a gradual formation of the iron lake occurs, perhaps on account of the very rapid fall in solubility of $FeSO_4$ above *p*H 6.8.

It was further confirmed that these chrome dyes, when applied by the metachrome or chrome in the bath processes, are well protected from Fe when sodium chromate or dichromate are present in the liquor throughout the dyeing. These compounds are less effective when dyeing on a chrome mordant.

New Use for Vermiculite

Lubricating Properties of Fine Powder

VERMICULITE raw material (see THE CHEMICAL AGE, *41*, 1,051, 143), too small to be used after processing as loose insulating material for building, has been difficult to dispose of, much of it being thrown away at operating mines; mines that do not yield a substantial proportion of larger sizes have not been economical to work. A good deal has been done in developing mixtures with fireclay and bentonite for special refractories, and gratifying progress is being made in the use of vermiculite heat- and sound-insulating plasters, which are now made by several companies. The Mikolite Co., Kansas City, has recently called to the attention of the United States Bureau of Mines certain new products, one of which is Mikolite (expanded vermiculite), an extender for aluminium paints. It is claimed that this makes them work better than straight aluminium paint and gives 25 per cent. greater coverage per gallon. Vermiculite for this purpose is only 2/100,000 inch in diameter, and 1 oz. bulks approximately 5½ oz. by volume.

Other uses of this fine power (98 per cent. through 325-mesh) are as a cooling and lubricating agent in automobiles, both in the motor and in the transmission. The free silica or quartz content is said to be negligible; an analysis gives only 0.034 per cent. Tests are reported to have shown it to be non-abrasive and to have lubricating properties like those of graphite. Mikolite disperses readily in lubricating oil and is offered as a means of taking up uneven wear in automobile engines, increasing compression, and reducing oil consumption by filling the pores of metallic surfaces of the cylinder walls, pistons, etc. The material is not patented, but the company does not reveal the method of production beyond the statement that the material is not ground.

ACCORDING TO THE FIRST ESTIMATE, the area in India cultivated to linseed this season is 2,802,000 acres against 3,081,000 in 1938-39 and an average of 2,665,000 in the five years ending 1937-38.

INDUSTRIAL RESEARCH IN INDIA

Government Bureau's Annual Report

THE Industrial Research Bureau of the Government of India has just issued its annual report for the past year. The Bureau is continuing investigations into the industrial utilisation of milk casein with a view to its use for the production of plastics. Casein is already being made in India. Adequate utilisation of the lactose content of the milk used for this purpose is also being investigated so that this highly nutritive component is not wasted. Several of the larger dairy companies in India have stated that attempts by them in the past to prepare rennet casein have not been successful, owing to the control of the optimum operation conditions being rendered unduly difficult by the normal atmospheric conditions. A modified technique for the preparation of rennet casein suitable for operation under Indian climatic conditions remains to be developed by laboratory investigations.

With a view to developing the manufacture in India of phenol and formaldehyde for use in synthetic resins for moulding powders, disinfectants, etc., arrangements have been made for investigations to be carried out by Dr. S. S. Bhatnagar and Mr. K. Jatkar on crude tar acids and phenol-cresol products from a coal distillation plant in Bihar. Contact is being maintained with the Director of Industries, Mysore, regarding the possibilities of producing formaldehyde from the wood distillation plant of the Mysore Iron and Steel Works. The Indian Lac Research Institute, Ranchi, is developing a shellac-urea-formaldehyde moulding powder. The Industrial Reserve Bureau is in correspondence with the Director of Industries, Mysore, regarding the possibility of producing urea, which might become available in due course as a result of the installation of ammonia-producing plant in the State. An important component of many industrial moulding powders is wood pulp. A typical sample of imported material has been forwarded to the Forest Research Institute, Dehra Dun, for examination and a report as to the possibility of obtaining similar material locally.

The improvement of paints and utilisation of indigenous materials for paint manufacture, development of a technique to guide the manufacture of efficient dry cells, utilisation of Indian vegetable oils as lubricants and fuels in internal combustion engines, improvement of limes and allied building materials, investigations to aid the glass industry and investigations and tests to aid the electric lamp industry were, the report states, the principal subjects of research at the Research Branch of the Government Test House.

Red Lead Pigments

Investigations on red lead paints have included the study of particle size and the effects of dispersing and suspending agents on setting as well as on weathering properties. The tendency of pigment to settle to the bottom of the container and subsequently to set hard was observed over long periods of storage, the degree of setting being estimated by the length of time required to stir up the pigment into suspension in the vehicle again. If the settling and setting of red lead pigment are due to the chemical reactions taking place at the surface of the pigment particles between them and the medium, it should be possible to inhibit this tendency by introducing dispersing agents capable of forming a thin layer of molecular dimensions around the pigment particles and thus to reduce the reaction tendency. Setting might also be reduced by introducing a small quantity of non-reactive pigment or extender as a " suspending " agent to prevent the red lead particles from coming into close contact with each other and getting " cemented " by the reaction products.

Both the theoretical concepts were tested experimentally by using a number of metallic soaps and fatty acids as dispersing agents and materials such as talc, asbestine, etc., as suspending agents. The results so far obtained indicate that though the suspending agents do help to retard settling, they cannot prevent it altogether, although certain dispersing agents such as aluminium stearate, used in as small a proportion as 0.75 per cent., have been found to be very effective towards inhibiting settlement. In order to determine what effects these dispersing and suspending agents might have on the durability of red lead paints, several promising compositions were subjected to natural and also to accelerated weathering. From results so far obtained the use of aluminium stearate is found to be in no way harmful. The work is still in progress.

Use of Aluminium Stearate

The importance of particle size distribution from the point of view of settling and setting properties and of the effects of the dispersing agents on it was realised at an early stage, but the method now in use in this investigation was developed only during the year under review. Results up to the present indicate that the particle size of the pigment in the finished paint, which is normally a function of the amount of grinding to which it has been subjected, is also greatly influenced by the presence of dispersing agents. It has been found that aluminium stearate reduces the particle size of the red lead pigment to a remarkable degree. An attempt is being made to establish a definite correlation between the particle size distribution and the setting properties of the red lead paints.

It has been considered hitherto that the chemical composition of the red lead pigment, especially its free lead monoxide content, has an influence on the setting properties. This contention also is being subjected to a critical examination, for though, generally speaking, there appears to be some truth in it, it cannot always be relied upon for the purpose of predicting the setting tendencies of a given pigment.

Pyrolusite for Dry Cells

A study of the different variables affecting the manufacture of dry cells reveals that the starch content in the electrolyte could be considerably reduced without adverse effect, and that a high water content in the depolariser mixture, consistent with practical considerations of dolly moulding, was beneficial. A certain number of pyrolusites of Indian origin gave promising results, though most of them indicated that without pre-treatment or admixture of artificial manganese dioxide they would not function satisfactorily. Artificial manganese dioxides of various origins invariably improved the cell characteristics when added in small proportions.

Further work carried out to determine the effect of molasses on the strength of lime-cement mortars has yielded somewhat erratic results, probably because the reaction between lime and molasses is very rapid and difficult to control; while the surface of the mortars appears to harden much more rapidly than the body, very likely owing to the effect of the carbon dioxide in the atmosphere. In general, however, the test results indicate that the setting time of the mortars is decreased considerably and the tensile strength is generally increased, the latter being more pronounced during early periods. There exists an optimum percentage of molasses at which the strength increases uniformly with time, namely between 10 to 15 per cent. of molasses calculated on lime. The addition of further molasses leads to cracking and consequently erratic results.

The effects of bentonite admixtures on the tensile and compressive strengths of cement mortars, having different water-cement ratios, have been further investigated and it appears that in plastic mixtures, in which bentonite serves the useful purpose of preventing segregation of the aggregate, the compressive strength is not seriously affected.

Several methods and processes are in operation for decolorising china clay with a view to rendering it suitable for use as sizing material in the textile industry. Hydrochloric acid treatment appears to give promising results.

HYDROGEN FLUORIDE IN INDUSTRY

Its Use in Organic Chemical Processes*

ANHYDROUS hydrogen fluoride has been made available commercially within the past ten years. It is now obtainable in steel cylinders or in tank cars, and recent developments indicate that it will find extensive large-scale uses. The laboratory methods for obtaining the material are slow and require considerable technical skill, but they must be used for material of the highest purity. The latest development is that of the author who, in 1924, modified Fremy's process of heating carefully purified and dried potassium hydrogen fluoride by applying electrolytic methods.

The industrial method consists of a carefully controlled reaction between calcium fluoride and sulphuric acid at a high temperature, followed by a distillation of the gaseous products of this reaction. In this process steel equipment is used throughout. The liquefied gas is stored in steel storage tanks. Pipes, fittings, and valves are all made of steel. The commercial material contains less than 0.5 per cent. water, the average being 0.1 to 0.2 per cent. Silicon fluoride is less than 0.1 per cent. and often as low as 0.01 per cent. It contains a small amount of sulphur dioxide which can be removed if required.

Anhydrous hydrogen fluoride, or hydrofluoric acid, is a liquid of high dielectric constant, a good ionising solvent for many salts, and a good solvent for many organic substances, particularly those containing oxygen such as alcohols, carboxylic acids, ethers, ketones, etc. Aromatic compounds are appreciably soluble in it, and it is in them. A useful property is that the other halogen halides are not soluble in it to any appreciable extent.

It is also a powerful dehydrating agent, reacting with water with the evolution of considerable heat. No chemical reagent so far tried can be added to it to dry it. Sulphuric acid reacts to form fluorosulphuric acid and liberate water. Phosphorus pentoxide reacts similarly. Calcium chloride reacts to liberate hydrogen chloride. It can, however, be dried by electrolysis, the conductivity diminishing as the water is eliminated. It is fortunate that for many reactions of industrial interest absolutely anhydrous material is not essential. Some reactions will tolerate a considerable percentage of water.

It has recently been found that HF is a useful reagent for many organic chemical reactions. In some of these it acts as a fluorinating agent, but in most of them the products formed contain no fluorine. For conducting these reactions on an industrial scale, HF appears to have properties which should make it preferred over other reagents used to obtain the same products. The chemical properties which probably govern its action in organic reactions are its strong solvent property, its high acidity, its great dehydrating tendency, the insolubility of the other halogen halides in it, and its great tendency to combine with itself and other substances to form molecular complexes.

Polymerisation

Everyone who has worked with hydrogen fluoride has experienced its powerful action in polymerising organic substances. Rubber becomes a hard brittle mass when acted upon by hydrogen fluoride. Unsaturated organic compounds are readily polymerised, particularly those containing the olefin linkage. On the other hand it does not polymerise aromatic compounds such as benzene, toluene, naphthalene, etc.

Hydrogen fluoride can rather surprisingly be used to prepare simple organic compounds in good yields and without the formation of any appreciable amount of unwanted polymers, which will probably constitute the greatest industrial use of the material. As a catalyst for alkylation reactions, it has been used with alkyl halides, olefines, alcohols, esters, ethers, and with strained ring compounds. HF may be used to alkylate compounds which are as difficult to alkylate as benzoic acid or aromatic compounds containing the nitro group. The reason probably is that it may be used at relatively high temperatures for long periods of time without the formation of excessive amounts of tars.

The preparation of ketones can be readily accomplished by the use of anhydrous hydrogen fluoride. In these acylation reactions the carboxylic acid, its anhydride, the acid halide, or the ester of the acid may be used. These reactions require a considerable excess of hydrogen fluoride; and since the oxygen-containing compounds are very soluble in liquid HF, the reaction probably takes place in the liquid phase. Most of the reactions take place readily at 80°-100° C., but with very active reagents 0°-20° C. can be employed.

In addition to condensation reactions, HF is an effective fluorinating agent in certain cases. It reacts readily with acid halides to form the acid fluoride and the hydrogen halide. With acid anhydrides it forms the acid fluoride and the acid. Like the other hydrogen halides HF can be caused to add to the double bond between two carbon atoms.

Chemical and Physical Properties

Some striking differences exist between the use of hydrogen fluoride and sulphuric acid for condensation reactions which, from the industrial point of view, are in favour of hydrogen fluoride. Sulphuric acid has a great tendency to sulphonate organic substances, particularly the aromatics, and undesired sulphonated residues are formed. In spite of the fact that under suitable conditions HF can add to organic compounds, it cannot react in a manner similar to sulphonation because it contains no oxygen. Also, in none of the condensation reactions have fluorine-containing products been found. Sulphuric acid is also an oxidising agent, and the oxidation of strongly reducing organic compounds results in reduced yields of desired products and in obnoxious residues.

Technical advantages in the use of HF are immediately obvious from a consideration of its physical properties. Its low formula weight of 20 gm. gives more effective chemical per pound than any of the other agents. With its low freezing point (−83° C.) it need never be handled as a solid, while its convenient boiling point (19.4° C.) enables it to be handled as a liquid or a gas. Its addition and removal from reaction and storage vessels can be done entirely through pipes and controlled by valves. It can be stored at high concentration without excess pressure, such as must be used with BF_3. Even for reactions at 100° C. it can be retained as liquid in the reaction vessels without abnormally high pressures. Its vapour pressure at 50° C. is only about 2.5 atmospheres. The difficulties of handling a hygroscopic salt such as $AlCl_3$ will never be experienced with HF. If it is necessary to add water at any stage of the process, less heat will be evolved per formula weight in the case of HF than with any of the other agents, and less cooling will have to be provided. If it is possible to remove the agent by vaporisation, less heat will be required for HF than for sulphuric acid or aluminium chloride. Its high fluidity and low surface tension will enable the liquid to flow rapidly, and smaller pipes and valves will be required for it than for sulphuric acid.

Coupled with its chemical properties, its boiling and freezing point will result in further economies in industrial practice. The freedom from the formation of tarry residues and sludges and the complete liquid solution of the products in most reactions will enable them to be completely and clearly drained from the reaction vessel. In the separation of the

* From a paper presented by J. H. Simons, of Pennsylvania State College, in the symposium on Unit Processes before the Division of Industrial and Engineering Chemistry at the 98th meeting of the American Chemical Society, Boston, Mass. (Ind. Eng. Chem., *32*, 2, 178-183).

products from the reaction mixture when HF is used, it will, in general, not be necessary to add water. Technical advantages of great importance will thus be obtained. The HF will be removed by distillation in most cases. Its temperature of boiling is so low that it can be vaporised without injury to the desired product or the formation of obnoxious substances. Besides saving a number of steps in the total process, the HF can, in most cases, be recovered for further use. This is not true for any other agent. In addition, distillable products can be separated in the same distillation. Should the starting substances be distillable and the reaction not go to completion, they can be recovered at the same time. With most other condensing agents in most reactions, any of the starting materials not used are lost in the process. The over-all yields of desired products should therefore be greatly increased. With the ability to recover the starting materials and little loss of them in the formation of undesired residues, over-all yields of products should be extremely high.

Anhydrous HF when pure is without action on most metals. It reacts with the alkali metals but not with the magnesium or aluminium. In the absence of oxygen or other oxidising agent there is no appreciable action on copper, iron, or nickel. Alloys such as stainless steel, Monel metal, etc., are quite resistant. Brass withstands the pure liquid or gas but is rapidly acted upon in the presence of water or oxygen. The same is true of lead, soft solder, etc. When iron vessels are used, tarry residues are formed that are absent when copper vessels are used for the same reaction. Steel vessels are, however, satisfactory as long as the condensation reactions are not carried out in them. Commercial steel pipe may be used with screw joint fittings; if flanges are used, they should be made of forged steel. Welding is excellent for making connections provided that slag-free welds are obtained. Cast iron cannot be employed.

Many substances react vigorously with anhydrous hydrogen fluoride, and they should not be used at any point where they come in contact with this substance. Glass, quartz, porcelain, refractories, and any silica-containing material are rapidly attacked. Cellulose-containing substances are dissolved with reaction, and wood will not withstand its action. All natural and synthetic resins, gums, plastics, etc., tried in this laboratory are attacked by the anhydrous material.

The danger of handling HF is probably overestimated provided that reasonable care is taken. It is corrosive to living tissue and causes burns if allowed to come in contact with the skin. Inhaling the vapours is dangerous, but they are acidic, and are readily detected and easily neutralised. If bodily contact is made with HF, the parts should be immediately and thoroughly washed, since it absorbs rapidly and pain may not be experienced until 5 to 8 hours later. If the parts affected are small, calcium hydroxide paste should be immediately applied; it can be replaced later with a salve of calcium lactate or glutonate, magnesium oxide, or a combination of them. The salve should be kept moist and must contain no oil or grease. If the parts affected are large, an aqueous solution of ammonia can be used as a wash, to be followed by the calcium or magnesium salve. This treatment is based upon the principle that it is important both to neutralise the acid and precipitate the fluoride ion and to do these quickly. When properly understood, hydrogen fluoride is not as dangerous as many other chemicals used on a large scale.

Colour Chemists at Manchester

Pigment Problems Discussed

MEMBERS of the Manchester Section of the Oil and Colour Chemists' Association spent last Saturday afternoon in a discussion of four pertinent questions.

The first was the necessity of co-operation between pigment supplier and paint manufacturer in the laboratory testing of pigments where great accuracy of matching is required, particularly with reference to chrome greens. The subject was introduced by Mr. V. Watson, who pointed out that the nature of the medium used and the type and degree of grinding received may have an important effect on the pigment. Flotation is not solely a function of the pigment itself but is partly dependent on the type of medium used. The final shade of a pigment in a paint also depends upon the degree of development of shade achieved during the grinding with the medium.

Next Dr. V. G. Jolly dealt with the subject of the reliability of exterior exposure tests. This was an account of results obtained from statistical work on the durability of products made repeatedly to the same formula. Dr. Jolly dealt with the influence of uncontrollable variables and the need for the duplication of tests; criteria by which durability may be assessed; acceleration of breakdown due to exposure at 45 deg.; correlation of results of exposure tests with practical experience.

A review was made by Mr. G. A. Campbell of the accepted processes and their limitations, and of the theories involved in the pre-treatment of pigments, as well as of recent developments and applications from the colour-makers' viewpoint.

Finally, Mr. C. S. Farmer dealt with the problems associated with the use of alkyd resins under three heads:—(1) Alkyds particularly adapted to specialised uses and especially if applied under closely controlled technique; (2) essential modifications of formulations necessitated by the properties of alkyds causing variation from accepted standards of decorative and general-purpose air-drying finishes; (3) difficulties to be overcome by modifications of the resins themselves and also by education of the user.

Chemical Matters in Parliament

Liaison between Scientific Representatives

IN the House of Commons last week, Captain Plugge asked the Minister of Supply in connection with the visit of the French scientific delegation, what arrangements had been made for regular liaison between French scientific representatives and the Advisory Council on Scientific Research and Technical Development already set up under his auspices?

Mr. Burgin replied that regular liaison between the advisory council referred to and French scientific representatives was effected through the Mission Scientifique Franco-Britannique which had a permanent secretary resident in London, who would shortly be located in the Ministry of Supply. The mission had contact with the whole of the French war-time scientific organisation. There was, in addition, a direct link between the Ministry of Supply and the French Ministère de l'Armement, which could be used by the advisory council for matters relating to scientific inventions, in the form of a Ministry of Supply officer who had been appointed liaison officer in the French Ministère and would shortly take up his duties in Paris.

Sir T. Moore asked the Minister of Supply how many meetings had been held to date of the Advisory Council on Scientific Research and Technical Development, set up under the auspices of his Ministry; what sub-committees of the council had been established; and with what membership.

Mr. Burgin: One meeting of the advisory council has been held; further meetings have been arranged at two monthly intervals. Ten committees of the council have been established, but it would not be in the public interest to disclose either the titles or the membership of these committees.

IMPORTS OF AMMONIUM NITRATE into Chile in 1938 included 3,859 long tons from Germany, 671 from the United States, and 2,147 from Britain. As it is reported that Chile is in urgent need of certain types of fertiliser it would appear that an opportunity presents itself to British exporters; domestic production of explosives has also been recently much developed, and raw materials for the industry are likely to be needed.

PERSONAL NOTES

SIR ARTHUR STANLEY has resigned from the board of the British Match Corporation. The company has appointed MR. JOSEPH H. G. REED in his stead.

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MR. FREDERICK C. STEWART, chairman of Kelvin, Bottomley and Baird, Ltd., scientific instrument makers, Glasgow, has been elected to the directorate of the Glasgow Chamber of Commerce for the next three years.

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MR. WILLIAM MARTIN, of William Martin, Sons and Co., Coatbridge, has been appointed representative of the Scottish Bar Iron Manufacturers' Association on the directorate of the Glasgow Chamber of Commerce, in succession to Mr. D. J. Garrett, who is retiring from business.

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In Convocation at Oxford last Tuesday, the Vice-Chancellor, the President of Magdalen, presiding, it was agreed to confer the honorary degree of D.Sc. on Dr. E. V. APPLETON, formerly Wheatstone Professor of Physics at King's College, London, and Jacksonian Professor of Natural Philosophy in the University of Cambridge.

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Liverpool University Chemical Society's medal, which is awarded each year to a distinguished man of science who is an old student of the department, has been presented to DR. R. A. MORTON. This is the first time it has been presented to a member of the staff of the University. Dr. Morton has carried forward the work of Professor Baly, and has improved greatly the technique of spectrographic analysis.

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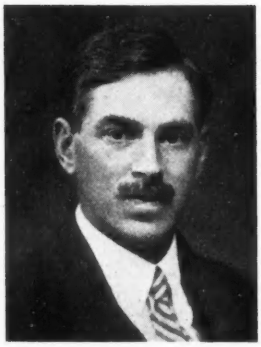
At the request of Sir Walter Monckton, Director-General of the Press and Censorship Bureau, SIR WILLIAM BRAGG, as president of the Royal Society, has undertaken the formation of a scientific panel to assist the bureau in arranging the censorship of papers in scientific journals. PROFESSOR A. C. EGERTON, who will deal with chemistry matters, is among those who have agreed to serve on the panel. Others include PROFESSOR C. R. HARINGTON (biochemistry), PROFESSOR V. H. BLACKBURN (botany and agriculture), DR. H. L. GUY (engineering sciences), PROFESSOR P. G. H. BOSWELL (geology), PROFESSOR S. CHAPMAN (mathematics), DR. C. H. DESCH (metallurgy), DR. C. G. DARWIN (physics), PROFESSOR A. V. HILL (physiology), PROFESSOR F. C. BARTLETT (psychology), PROFESSOR W. W. C. TOPLEY (bacteriology and pathology), PROFESSOR M. GREENWOOD (statistics), SIR GUY MARSHALL (zoology).



Professor A. C. Egerton.

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MR. EDWARD E. BILLINGTON, managing director of Edward Billington and Son, Ltd., cattle food manufacturers and distributors, was recently elected president of the Liverpool Seed, Oil, Cake and General Produce Association in succession to Mr. J. W. Ivory. MR. W. D. WILLIAMS, a former director of the Liverpool United General Produce Association, was elected vice-president. MR. E. H. WHARTON-DAVIES, managing director of the Cattle Food Supply Company, Ltd., Liverpool and London, was re-elected hon. treasurer. MR. JOHN MORETON (Langlands, Lewis and Robinson) was re-elected chairman of the Feeding Stuffs Executive, and MR. A. R. GATES (Liverpool Central Oil Company, Ltd.) was elected chairman of the General Produce Executive.

At the annual general meeting of the Institute of Export last Tuesday, MR. N. R. CRUTE, Director, International Lead Oxide Convention, International White Lead Convention and Associated Lead Manufacturers Export Co., Ltd., was elected Treasurer of the Institute, and MESSRS. H. S. MACKINTOSH, Joint General Manager of Overseas Business, Pinchin, Johnson and Co., Ltd., and G. W. STARTIN, Export Manager, Albright and Wilson, Ltd., were among those elected to the Council.

OBITUARY

The death is announced of MR. JOHN BRUNTON, a director of the Rugby Portland Cement Company, Limited.

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MR. THOMAS RHODES, until lately the head of James Grisdale and Sons, candle manufacturers, died recently at Otley, aged 86.

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MR. MARK ROBSON, managing director of Newalls Insulation Co., and the Washington Chemical Co., Ltd., died recently at Newcastle-on-Tyne.

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MR. WILLIAM KENWORTHY, founder of the firm of Crystal and Co., chemical manufacturers of Rochdale, in 1894, died last week at Colwyn Bay, aged 71.

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MR. HAROLD FRANCE, Mayor of Dewsbury, and managing director of J. Brown and Co., Ltd., chemical manufacturers of Dewsbury, died last Tuesday at Mirfield, Yorks, aged 57.

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SIGNOR VITTORIO CASABURI, a noted Italian authority on the chemistry of tanning, died in January, aged 49. An alumnus of the University of Genoa, he completed his studies at Leeds University, and had since been employed at the Ford Morocco Co., Wilmington, U.S.A., and the Badische Company of Ludwigshafen. Since 1921 he had directed the Italian State Leather Research Station at Naples.

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Professor ALEXANDRE DESGREZ, who died recently in France in his 77th year, was famous for his work in the field of organic chemistry. Industrially his most important discovery was the method by which acetaldehyde could be derived economically from acetylene, with the subsequent preparation of ethyl alcohol, by reduction, from acetaldehyde. He also applied the Friedel-Crafts reaction to the preparation of aromatic nitriles by the action of cyanogen on benzene and its homologues in presence of aluminium chloride, and investigated the decomposition of chloroform and the toxicity of acetone compounds. Professor Desgrez occupied the Chair of Medical Chemistry at the Sorborne from 1912 to 1936.

FURFURYL ALCOHOL AND FORMIC ACID

In a letter to *Chemical and Chemical Engineering News* (News Ed., 1940, *18*, 2, 72) Walter C. Tobie comments on the explosive reaction of furfuryl alcohol with formic acid.

It is well known that 2-furfuryl alcohol (2-furancarbinol) will polymerise rapidly (sometimes with explosive violence) when in contact with strong mineral acids. It does not appear to be generally known that a similar explosive reaction may occur in the presence of concentrated formic acid.

In an attempt to prepare a small amount of furfuryl formate, 9 c.c. of furfuryl alcohol and 4 c.c. of concentrated formic acid were mixed at a temperature of about 30° C. The mixture rapidly became warm and turned a deep cherry red. After about a minute, it burst from the mouth of the test tube with explosive violence, discharging drops of a sticky, brown, rapidly hardening resin to a distance of several feet. If the trial had been conducted on a larger scale, the result might have been much more serious.

General News—From Week to Week

THE TREASURY HAS MADE AN ORDER exempting dodecyl alcohol from Key Industry duty from February 21, until June 30, 1940. Copies of the Order, which is entitled "The Safeguarding of Industries (Exemption) No. 4 Order, 1940," may be obtained from H.M. Stationery Office.

ACCORDING TO TRADE RETURNS for the month ended January 31, imports of chemicals, drugs, dyes and colours into the United Kingdom were valued at £1,706,925, an increase of £633,021 compared with January, 1939. Exports were valued at £2,780,597, an increase of £1,029,988, compared with figures for the corresponding period last year. Re-exports were valued at £65,029.

BORAX AND CHEMICALS, LIMITED ("Three Elephant" brand Boron products) announce that their main (temporary) offices will remove to-day to Marlyn's House, Guildford, Surrey. Telephone Guildford 3327-8; Inland telegrams: "Boraxchem Guildford"; Foreign telegrams: "Borax Chemicals Guildford." Their offices in London and Liverpool will remain open to deal with urgent orders and inquiries.

THE 1939 ANNUAL REPORT OF THE IMPERIAL INSTITUTE, just received, contains some interesting details of the work of the Mineral Resources Department. The chemical and mineralogical laboratories made reports on 110 investigations, which involved the examination of 322 samples from all parts of the Empire, resulting in many cases in the commercial development of hitherto unexploited mineral deposits.

SEVERAL THOUSANDS OF EMPLOYEES in Liverpool seed-crushing and oil cake mills will receive a war supplement of 4s. per week for adult male workers, 2s. for women and proportionate increases for youths. The increases will rank for overtime calculations and are being reckoned from the first pay-day in February. The 4s. advance, added to an advance of 5s. secured last September, is the largest national advance since the beginning of the war.

DETAILS OF AN IMPROVED ROTARY VISCOMETER, of the Couette type, devised by A. H. Nissan, L. V. W. Clark, and A. W. Nash, at the University of Birmingham, include a claim to an overall accuracy of 1 per cent. in the range of viscosities exceeding 10 poises, using N.P.L. viscometry as a standard check method. A paper describing the apparatus and the points in which it improves on previous apparatus is published in *J. Sci. Inst.*, *17*, 2, 33 (February, 1940).

MESSRS. MARTIN SECKER AND WARBURG, LTD., announce for publication in April *The Conquest of Bacteria*, by F. Sherwood Taylor, the well-known writer on scientific subjects. The book describes the recent tremendous advances in chemotherapy, one of the most dramatic episodes in present-day healing, culminating in the discovery of the remarkable drug, M & B 693, most potent of the sulphanilamide group, a large supply of which has recently been sent to Finland to combat pneumonia. The published price of the book is to be about 6s.

IN THE ANNUAL REPORT of the Testing House of the Manchester Chamber of Commerce, it is stated that the usual series of chemical purity tests have been punctuated from time to time by the call for special types of determination to be made by the Chemical Department. Noteworthy analyses have been undertaken with dimethyl diphenylurea, an arsenical liquor, a liquid containing oil of citronella, Diesel fuel oil, rosin size, soaps, printers' inks, margarine, etc. Advice based on chemical work undertaken has been given in a number of cases and on such varied subjects as the resistance of colours to light, desizing, glaze or polish on sewing threads and protection to tentage by the cutch-bichromate treatment.

Foreign News

NORSK HYDROELEKTRISK KVELSTOF A/S, large-scale manufacturers of heavy chemicals and fertilisers, are erecting a new experimental factory for the production of potash from sea-water at Heroya. The company is already producing sodium nitrate from sea-water according to a process developed and patented by Mr. Henry Johnsen. The planned potash extraction process has been suggested, developed and patented by Mr. Jacob Kielland, and it has yielded quite promising results despite the fact that sea-water contains only 0.7 gm. of potassium chloride per litre.

A NEW COMPANY—A/S Teknokemo—has been registered at Copenhagen with an initial capital of 15,000 kroner, to manufacture a number of light chemicals.

GLEN DAVIS, Australia's first oil town, which is being built in Glen Alice Valley, New South Wales, was the main feature of the picture page of *The Times* last Saturday. Miners are shown at work on the face in the shale mine from which it is hoped to produce 30 million gallons of oil each year, and other illustrations depict the blasting and unloading of the shale and the works for the production of motor spirit.

IN VIEW OF THE INCREASING DEMAND for Japanese carbide, notwithstanding the limited production, the Department of Commerce has decided to put into operation a permit system for carbide exports. While exports of carbide to outside countries will be permitted, subject to official sanction, those to the "yen bloc" countries will be practically prohibited. Arrangements are being made by the Bureau of Chemistry for distribution control for carbide in Japan proper.

MR. S. HOUTH, MANAGING DIRECTOR of the Danish company, Nordisk Aluminiumindustri, said at a recent meeting that the past decade had seen a considerable increase of demand for aluminium in Denmark. Imports of Norwegian aluminium for refining purposes had risen from 200 tons in 1930 to over 1,800 tons last year, and a still greater consumption was expected this year. Denmark was purchasing her aluminium supplies from Sweden and Norway preferably because these countries were potential markets for the raw material—cryolite—from Greenland.

A SIXTY PER CENT. EXPORT TAX has just been imposed on rubber from Indochina, to compensate for the difference between the last current price of rubber at Singapore before the war and the average monthly price of rubber at the same place since the outbreak of hostilities. With the export dues already in force and the armament tax, amounting together to 3 francs per kg., it seems probable that the difficulties surrounding the export of Indochinese rubber to countries other than France will now become almost prohibitive, and such export will perhaps be stopped altogether.

Forthcoming Events

THE 43RD MEETING of the Midlands Section of the Society of Glass Technology will take place at the Talbot Hotel, Stourbridge, on February 26, at 7.30 p.m. A paper entitled "The Distribution of Temperature in Molten Glass and its Effect on Glassmaking Operations," will be given by Robert Halle, B.Sc.Tech.

AT THE ROYAL INSTITUTION, 21 Albemarle Street, London, W.1, on February 28, at 5.15 p.m., Professor W. L. Bragg will lecture on X-Ray Optics. On February 29 at 3 p.m., Sir Frederick Keeble will deliver a lecture on Plant Hormones.

AT THE ROYAL SOCIETY OF ARTS, John Adam Street, Adelphi, London, W.C.2, on February 28, at 2.30 p.m., a paper on Alternative Motor Fuels will be read by Dr. C. M. Walter, Engineer-in-Charge, Industrial Research Laboratories, City of Birmingham Gas Department. Lord Strabolgi will preside.

THE TWENTY-FIRST Annual General Meeting of the Newcastle Chemical Industry Club will be held in the Club Rooms, 18 Lovaine Place, Newcastle-on-Tyne, on February 29, at 7.30 p.m.

A JOINT LECTURE OF THE CHEMICAL SOCIETY, and the Sheffield University Chemical Society, entitled "Biological Applications of Synthetic Chemistry," will be delivered by Professor J. W. Cook on March 8, at 5.30 p.m., in the lecture theatre of the Chemistry Department, The University, Western Bank, Sheffield.

THE 71ST MEETING of the London Section of the Society of Glass Technology will be held, by the courtesy of the Directors, at the offices of Messrs. Holophane, Limited, Elverton Street, London, S.W.1, on March 13, at 6 p.m. The meeting will be devoted to "A Discussion on the Thermal Endurance of Glass." The opening speakers will be J. B. Murgatroyd, B.A., F.S.G.T., Dr. Eric Seddon, B.Sc., F.Inst.P., H. L. Crook, B.A., and R. W. Douglas, B.Sc.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

PURIFICATION OF ORGANIC COMPOUNDS.—Colgate-Palmolive-Peet Co. (United States, Jan. 31, '39.) 1832.

PROCESS FOR PREPARING SUBSTITUTED PHTHALIC ANHYDRIDES.—Compagnie de Produits Chimiques et Electro-metallurgiques Alais, Froges, et Camargue. (France, Jan. 26, '39.) 1600.

PROCESS FOR IMPROVING THE USEFUL QUALITIES OF WOOD CHARCOAL and the products thereof.—Compagnie Française de Raffinage. (France, Jan. 28, '39.) 1656.

PRODUCTION AND TREATMENT OF ORGANIC COMPOUNDS.—H. Dreyfus. 1696.

DEHYDRATION OF CASTOR OIL, ETC.—E. I. du Pont de Nemours and Co., and B. E. Sorenson. 1547.

PRODUCTION OF UREA ALDEHYDE DERIVATIVES.—E. I. du Pont de Nemours and Co. 1548.

CHEMICAL COMPOUND for the extinguishing of incendiary bombs or fire.—E. O. S. Hall. 1491.

PROCESS FOR THE MANUFACTURE OF DERIVATIVES of cyclopentanophenanthrene.—F. Hoffmann-La Roche and Co. A.-G. (Switzerland, Feb. 9, '39.) 1837.

PROCESS FOR MANUFACTURE OF CONDENSATION PRODUCTS.—F. Hoffmann-La Roche and Co. A.-G. (Switzerland, Feb. 16, '39.) 1838.

REACTIVATION OF HYDROGENATING CATALYSTS.—Houdry Process Corporation. (United States, Feb. 24, '39.) 1530.

MANUFACTURE OF DYESTUFFS of the anthraquinone series.—Imperial Chemical Industries, Ltd. (E. I. du Pont de Nemours and Co.). 1839, 1840.

MANUFACTURE OF DIOLEFINES from alcohols and aldehydes.—Instituto per lo Studio della Gomma Sintetica, A. Maximoff, and O. Canonici. (Italy, Feb. 15, '39.) 1551.

POLYMERISATION OF ETHYLENE.—J. R. Myles, E. G. Williams, E. Hunter, R. O. Gibson, E. W. Fawcett, M. W. Perrin, J. G. Paton, and Imperial Chemical Industries, Ltd. 1920.

PROCESS FOR THE PURIFICATION OF KETONES and ketols.—N. V. de Bataafsche Petroleum Maatschappij. (United States, Feb. 4, '39.) 1743.

MANUFACTURE OF METHACRYLIC ANHYDRIDE.—Norton Grinding Wheel Co., Ltd. (United States, Jan. 30, '39.) 1638.

PREPARATION OF RESINOUS COMPOSITION.—Pittsburgh Plate Glass Co. (United States, Feb. 18, '39.) 1773, 1774.

COMPOSITE RESINOUS PRODUCTS.—Pittsburgh Plate Glass Co. (United States, Feb. 18, '39.) 1869; (United States, Nov. 2, '39.) 1870.

EXTRACTION OF TIN and tungsten from low-grade ores and residues.—E. Pokorny. 1755.

CATALYTIC CRACKING OF HYDROCARBON OIL.—Standard Oil Development Co. (United States, March 11, '39.) 1908.

MANUFACTURE OF HIGH ANTI-KNOCK GASOLINE HYDROCARBONS.—Texaco Development Corporation. (United States, Jan. 27, '39.) 1651; (United States, March 8, '39.) 1652.

DEWAXING OILS.—Texaco Development Corporation. (United States, Feb. 11, '39.) 1944; (United States, Feb. 24, '39.) 1945.

PRODUCTION OF LUMINESCENT MATERIALS.—W. W. Triggs (Harshaw Chemical Co.). 1540.

Complete Specifications Open to Public Inspection

PROCESS PERMITTING THE INDUSTRIAL RECOVERY OF RESIDUAL MUDS and sediments obtained during the manufacture of osseins and gelatines.—P. Lanthier, and S. A. des Usines de Produits Chimiques d'Hautment. July 4, 1938. 27358/38.

COMPLETE REMOVAL OF ORGANIC SULPHUR COMPOUND from gases containing carbon monoxide and hydrogen.—Steinkohlen-Bergwerk Rheinpreussen. July 2, 1938. 3618/39.

PROCESS FOR PREPARING DERIVATIVES of sulphanilic acid amide. J. D. Riedel-E. de Haen A.-G. June 30, 1938. 15650/39.

SETTING SYNTHETIC FILMS and fibres.—E. I. du Pont de Nemours and Co. June 28, 1938. 17823/39.

PROCESS FOR SPLITTING-UP MIXTURES OF HYDROCARBONS.—N. V. de Bataafsche Petroleum Maatschappij. July 2, 1938. 18101/39.

MANUFACTURE OF PORTLAND CEMENT from materials comprising calcium sulphate.—I.G. Farbenindustrie. July 6, 1938. 18207/39.

PROCESS FOR THE MANUFACTURE OF COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Schering A.-G. July 1, 1938. 18399/39.

STARCH HYDROLYSIS.—Union Starch Refining Co. July 5, 1938. 18704/39.

PROCESS FOR PREPARING STEROL DEGRADATION PRODUCTS.—Chinoin Gyógyszer és Vegyeszetē Termekek Gyara Részvenytársasag (Dr. Kereszty and Dr. Wolf). June 28, 1938. (Cognate Application; 18725/39. 18724/39.

MANUFACTURE OF ALDEHYDES of the saturated and unsaturated pregnane series.—Soc. of Chemical Industry in Basle. July 1, 1938. (Cognate Applications, 18806-8/39.) 18805/39.

MANUFACTURE OF ALDEHYDE KETONES.—Soc. of Chemical Industry in Basle. July 1, 1938. (Cognate Application, 18810/39.) 18809/39.

MANUFACTURE OF ESTERS OF THE OXYSTILBENE SERIES.—Soc. of Chemical Industry in Basle. July 2, 1938. (Cognate application, 18812/39.) 18811/39.

PROCESS FOR IMPROVING THE FASTNESS OF DYEINGS.—Soc. of Chemical Industry in Basle. July 4, 1938. (Cognate Applications, 18814-5/39.) 18813/39.

PROCESS FOR THE TREATMENT OF LOW TEMPERATURE AND MIDDLE TEMPERATURE TARS.—Byk-Guldenwerke Chemische Fabrik A.-G. June 29, 1938. (Cognate Application, 18990/39.) 18989/39.

STABILISATION OF AQUEOUS DISPERSIONS of polymerised halogenated dienes.—E. I. du Pont de Nemours and Co. June 29, 1938. 19000/39.

PROCESS FOR IMPROVING THE ANTI-KNOCK RATING OF HYDROCARBONS adapted for use as motor fuels.—Ruhrchemie A.-G. July 2, 1938. (Cognate Applications, 19136-7/39.) 19135/39.

MANUFACTURE AND USE OF DERIVATIVES OF SULPHIMIDES.—Deutsche Hydrierwerke A.-G. June 30, 1938. 19145/39.

PROCESS FOR THE PRODUCTION OF COPPER free from oxygen and of high conductivity.—Metallges. A.-G. July 4, 1938. (Cognate Application, 19170/39.) 19169/39.

FAT PRODUCTS enriched in vitamins, and method of producing the same.—E. Strauss. July 6, 1938. 19644/39.

Specifications Accepted with Date of Application

FAR-REACHING DEOXIDATION OF STEEL by carbon.—Soc. d'Electro-Chimie, d'Electro-Metallurgie, et des Aciéries Electriques d'Ugine. March 16, 1937. 517,366.

HIGH VACUUM DISTILLATION OF VITAMIN D or substances containing vitamin D.—Kodak, Ltd. (Eastman Kodak Co.). April 20, 1938. 517,214.

PRODUCTION OF STARCH GRITS.—International Patents Development Co. June 17, 1937. 517,368.

MANUFACTURE OF GASOLINE AND FUEL OIL by cracking crude petroleum stock.—Sinclair Refining Co. June 15, 1937. 517,269.

PREPARATION OF THERAPEUTICALLY USEFUL HETEROCYCLIC COMPOUNDS.—May and Baker, Ltd., G. Newbery, and P. Viaud. June 3, 1938. (Cognate Application, 26963/38.) 517,272.

TREATMENT OF CARBON BLACK and lamp black.—Columbian Carbon Co. June 17, 1937. 517,274.

CATALYTIC DESTRUCTIVE HYDROGENATION OF HEAVY OILS or residues containing asphalt.—J. J. V. Armstrong (N. V. Internationale Hydrogeneeringsoctrooien Maatschappij (International Hydrogenation Patents Co.)). June 20, 1938. 517,374.

MANUFACTURE OF α-DICARBONYL COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 13, 1937. (Cognate Application, 20643/38.) 517,276.

MANUFACTURE OF KETONES of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 14, 1937. (Cognate Application, 20902/38.) 517,277.

MANUFACTURE OF POLYOXY COMPOUNDS of the cyclopentanopolyhydrophenanthrene series, and derivatives thereof.—Soc. of Chemical Industry in Basle. July 17, 1937. (Cognate Application, 21250/38.) 517,288

PRODUCTION OF BASES FOR LACQUERS, plastics, and like materials, and the products produced therefrom.—Binney and Smith Co. July 16, 1937. 517,379.

MANUFACTURE OF CHLORINE and alkali metal nitrates.—Imperial Chemical Industries, Ltd. July 21, 1937. (Cognate Application, 28578/38.) 517,174.

MANUFACTURE OF SYNTHETIC RUBBER.—Istituto per lo Studio della Gomma Sintetica. July 21, 1937. 517,302.

POLYMERISATION OF SYMMETRICAL DICHLORETHYLENE.—Rohm and Haas Ges. July 22, 1937. 517,195.

PRODUCTION OF UREA-FORMALDEHYDE CONDENSATION PRODUCTS.—Albert Products, Ltd. Aug. 12, 1937. 517,196.

OLEFINE OXIDATION and catalyst therefor.—Carbide and Carbon Chemicals Corporation. Aug. 7, 1937. 517,332.

CATALYST AND PROCESS FOR OLEFINE OXIDATION.—Carbide and Carbon Chemicals Corporation. Aug. 7, 1937. (Cognate Application, 21874/38. 517,333.

PROCESS FOR THE MANUFACTURE OF POLYAZO DYESTUFFS.—I. G. Farbenindustrie. July 24, 1937. 517,335.

MANUFACTURE OF ALDEHYDES of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 25, 1937. (Cognate Application, 22028/38.) 517,346.

MANUFACTURE OF FLEXIBLE FIBRES from casein.—S. P. Gould, and E. O. Whittier. Aug. 12, 1937. 517,353.

MANUFACTURE OF IODINATED ESTERS.—D. J. Branscombe, and Imperial Chemical Industries, Ltd. July 25, 1938. 517,382.

APPARATUS FOR HEATING and spraying viscous waxes and oils.—J. A. Erickson. July 26, 1938 517,395.

PRODUCTION OF DEXTRAN ETHERS.—G. L. Stahly, and W. W. Carlson. July 29, 1937. 517,397.

Weekly Prices of British Chemical Products

MODERATELY active trading conditions are reported from nearly all departments of the general chemical market and the volume of inquiry both for home and export is fairly substantial. Contract deliveries are well maintained, and the movement of chemicals to the chief consuming industries covers good quantities. The price position continues more or less unchanged with the undertone decidedly firm. Chemicals such as yellow prussiate of potash, lithopone, barium chloride and sodium and potassium bichromate remain scarce and overseas supplies of these items continue to command high prices. Formaldehyde is in good request and rather more interest is displayed in chlorate of soda. Lead oxides and white lead are in steady demand with the convention scale of quotations unaltered. In the market for coal tar products a moderate business has been put through with the carbolic acid section displaying more activity than elsewhere; quotations for both the crude and crystals are firm.

MANCHESTER.—Although there is a steady call for supplies of heavy chemical products against contracts already entered into new buying interest on the Manchester market during the past week has been described as only moderate. A wide range of textile chemicals for the cotton and woollen industries is moving steadily into consumption, with the paper-making and other consuming industries also taking good quantities. The price position generally continues on a firm basis. With regard to the by-products crystal carbolic is said to be very difficult to obtain for early delivery and somewhat higher prices are being indicated for this as well as for the crude material, whilst solvent naphtha and xylol are also firmer sections.

GLASGOW.—Business remains fairly steady in the Scottish heavy chemical market. Increased prices are still being notified but deliveries are being brought up to date.

Price Changes

Rises: Calcium Acetate, Carbolic Acid (Manchester), Chlorine, Hydrochloric Acid, Methyl Acetone, Potassium Permanganate (B.P. and commercial), Salammoniac (dog-tooth crystals), Salt Cake, Soda Ash, Sodium Bisulphite Powder, Sodium Perborate, Sodium Sulphide, Sodium Sulphite, Wood Tar, Xylol (Manchester).

Falls: Nitric Acid.

*In the case of certain products, here marked with an asterisk, the market is nominal, and the last ascertainable prices have been scheduled. At present all intermediates are included under this head.

General Chemicals

ACETIC ACID.—Maximum prices per ton: 80% technical, 1 ton, £34 15s.; 10 cwt./1 ton, £35 15s.; 4/10 cwt., £36 15s.; 80% pure, 1 ton, £36 15s.; 10 cwt./1 ton, £37 15s.; 4/10 cwt., £38 15s.; commercial glacial, 1 ton, £44; 10 cwt./1 ton, £45; 4/10 cwt., £46; delivered buyers' premises in returnable barrels. £4 per ton extra if packed and delivered in glass.

ACETONE.—Maximum prices per ton, 50 tons and over, £49 10s.; 10/50 tons, £50; 5/10 tons, £50 10s.; 1/5 tons, £51; single drums, £52, delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

*ALUM.—Loose lump, £8 7s. 6d. per ton d/d.

*ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs.

AMMONIA, ANHYDROUS.—99.95%, 1s. to 2s. per lb. according to quantity in loaned cylinders, carriage paid; less for important contracts.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £18 per ton, in casks, ex wharf. See also Salammoniac.

*ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—99/100%, about £25 per ton, ex store

BARIUM CHLORIDE.—98/100%, prime white crystals, £11 10s. 0d. to £13 0s. 0d. per ton when available, bag packing, ex works; imported material would be dearer.

BLEACHING POWDER.—Spot, 35/37% £9 5s. per ton in casks, special terms for contract.

BORAX, COMMERCIAL.—Granulated, £20 10s. per ton; crystal, £21 10s.; powdered, £22; extra finely powdered, £23; B.P. crystals, £29 10s.; powdered, £30; extra fine £31 per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £64; powder, £65; in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

BORIC ACID.—Commercial granulated, £34 10s. per ton; crystal, £35 10s.; powdered, £36 10s.; extra finely powdered, £38 10s.; large flakes, £47; B.P. crystals, £43 10s.; powdered, £44 10s.; extra fine powdered, £46 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain.

CALCIUM BISULPHITE.—£7 10s. per ton f.o.r. London.

*CALCIUM CHLORIDE.—GLASGOW: 70/75% solid, £5 12s. 6d. per ton ex store.

CHARCOAL LUMP.—£10 to £12 per ton, ex wharf. Granulated £11 to £14 per ton according to grade and locality.

*CHLORINE, LIQUID.—£19 15s. per ton, d/d in 16/17 cwt. drums (3-drum lots); 4¾d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 4d. per lb.; liquor, £19 10s. per ton d/d station in drums. GLASGOW: Crystals 4d. per lb. in original barrels.

CHROMIC ACID.—1s. per lb., less 2½d.%; d/d U.K. GLASGOW: 1s. 0¼d. per lb. for 1 cwt. lots.

CHROMIC OXIDE.—1s. 2d. per lb., d/d U.K.

CITRIC ACID.—1s. 2d. per lb. MANCHESTER: 1s. 3d.

*COPPER SULPHATE.—Nominal.

CREAM OF TARTAR.—100%, £6 2s. to £6 7s. per cwt., less 2½%. Makers' prices nominal, imported material about £170 per ton.

FORMALDEHYDE.—40% by volume, £23 5s. to £25 per ton, according to quantity, d/d in sellers' returnable casks.

FORMIC ACID.—85%, £44 10s. per ton for ton lots, carr. paid, carboys returnable; smaller parcels quoted at 46s. 6d. to 49s. 6d. per cwt., ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HEXAMINE.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7d. per lb.; carriage paid for bulk lots.

HYDROCHLORIC ACID.—Spot, 6s. 1½d. to 8s. 7½d. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 9s. 2d. to 13s. per lb., according to quantity.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £30 10s. per ton; 50% by weight, £35; 80% by weight, £60; pale tech., 50% by vol., £36; 50% by weight, £42; 80% by weight, £67. One ton lots ex works; barrels returnable.

LEAD ACETATE.—White, £48 to £50, ton lots.

LEAD NITRATE.—About £40 per ton in casks.

LEAD, RED.—English, 5/10 cwt., £41 10s.; 10 cwt. to 1 ton, £41 5s.; 1/2 tons, £41; 2/5 tons, £40 10s.; 5/20 tons, £40; 20/100 tons, £39 10s.; over 100 tons, £39 per ton, less 2½ per cent., carriage paid; non-setting red lead, 10s. per ton dearer in each case; Continental material, £1 per ton cheaper.

LEAD, WHITE.—Dry English, less than 5 tons, £51; 5/15 tons, £47; 15/25 tons, £46 10s.; 25/50 tons, £46; 50/200 tons, £45 10s. per ton, less 5% carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £59 10s. 5/10 cwt., £58 10s.; 10 cwt. to 1 ton, £58; 1/2 tons, £56 10s.; 2/5 tons, £55 10s.; 5/10 tons, £53 10s.; 10/15 tons, £52 10s.; 15/25 tons, £52; 25/50 tons, £51 10s.; 50/100 tons, £51 per ton, less 5% carriage paid. Continental material £2 per ton cheaper.

LITHARGE.—10 cwt.-1 ton, £34 15s. per ton.

MAGNESITE.—Calcined, in bags, ex works, about £9 to £10 per ton.

MAGNESIUM CHLORIDE.—Solid (ex wharf), £10 per ton

*MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf

MERCURY PRODUCTS.—Controlled prices for 1 cwt. quantities: Bichloride powder, 9s. 1d.; bichloride lump, 9s. 8d.; bichloride ammon. powder, 10s. 7d.; bichloride ammon. lump, 10s. 5d.; mercurous chloride, 10s. 11d.; mercury oxide, red cryst., B.P., 12s. 3d.; red levig. B.P., 11s. 9d.; yellow levig. B.P., 11s. 7d.

*METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities.

*NITRIC ACID.—Spot, £19 to £26 per ton, according to strength, quantity and destination.

OXALIC ACID.—£59 5s. per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels, 59s. 9d. to 60s. per cwt., ex store; deliveries slow.

*PARAFFIN WAX.—GLASGOW: 3¾d. per lb.

POTASH, CAUSTIC.—Liquid, £25 to £30 per ton, according to quantity.

POTASSIUM BICHROMATE.—5¾d. per lb. carriage paid. GLASGOW: 5¾d. per lb., carriage paid.

POTASSIUM CHLORATE.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

POTASSIUM IODIDE.—B.P., 8s. to 11s. 2d. per lb., according to quantity.

POTASSIUM NITRATE.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.

POTASSIUM PERMANGANATE.—B.P. 1s. 5¼d. per lb.; commercial, £8 1s. 6d. per cwt., d/d.

POTASSIUM PRUSSIATE.—Yellow, about 1s. 8d. per lb., supplies scarce.

SALAMMONIAC.—Dog-tooth crystals, £44 per ton; medium, £38; fine white crystals, £16; in casks, ex store.
SALT CAKE.—Unground, spot, £4 1s. per ton.
SODA ASH.—Light 98/100%, £6 2s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£25 to £26 per ton, ex wharf.
SODIUM BICARBONATE.—About £10 10s. to £11 10s. per ton, in bags.
SODIUM BICHROMATE.—Crystals, 4¾d. per lb., net d/d U.K. with rebates for contracts. GLASGOW: 5¾d. per lb., carriage paid.
SODIUM BISULPHITE POWDER.—60/62%, £16 per ton d/d in 2-ton lots for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton, d/d according to quantity.
SODIUM HYPOSULPHITE.—Pea crystals, £16 17s. 6d. per ton for 2-ton lots; commercial, £13 10s. per ton. MANCHESTER: Commercial, £13; photographic, £16 10s.
SODIUM IODIDE.—B.P., for not less than 28 lb., 8s. 10d. per lb.; for not less than 7 lb., 10s. 9d. per lb.
*SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 5s. per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 15s. per ton for ton lots.
SODIUM PERBORATE.—10%, £4 10s. per cwt. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £16 to £17 per ton delivered for ton lots. Tri-sodium, £18 per ton delivered per ton lots.
SODIUM PRUSSIATE.—4½d. to 5½d. per lb.
SODIUM SILICATE.—£8 2s. 6d. per ton.
*SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. MANCHESTER: £4.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £13 15s. per ton d/d in drums; crystals, 30/32%, £9 10s. per ton d/d in casks. MANCHETTER: Concentrated solid, 60/62%, £13; crystals, £9 15s.
*SODIUM SULPHITE.—Pea crystals, spot, £16 per ton d/d station in kegs.
*SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 5½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. Makers' prices nominal; imported material 2s. 3d. to 2s. 6d. per lb., ex wharf. MANCHESTER: 1s. 5¾d. per lb.
ZINC OXIDE.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.
ZINC SULPHATE.—Tech., about £19 10s., carriage paid, casks free.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 9¾d. to 1s. 6d. per lb., according to quality. Crimson, 1s. 7½d. to 1s. 10½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.
BARYTES.—Imported material £6 to £9 per ton according to quality.
CARBON BLACK.—About 7d. to 7½d. per lb., according to quantity.
CARBON DISULPHIDE.—£29 to £34 per ton, according to quantity, in free returnable drums.
CARBON TETRACHLORIDE.—£48 to £53 per ton, according to quantity, drums extra.
INDIA-RUBBER SUBSTITUTES.—White, 5¾d. to 6¾d. per lb.; dark 5¼d. to 6d. per lb.
LAMP BLACK.—Imported material is quoted at about £35 to £40 per ton.
LITHOPONE.—30%, £18 17s. 6d. per ton; 60%, £31 to £32 per ton. Imported material would be dearer.
SULPHUR.—Finely powdered, about £15 per ton, delivered.
SULPHUR CHLORIDE.—6d. to 8d. per lb., according to quantity.
VEGETABLE BLACK.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.
VERMILION.—Pale or deep, 8s. 5d. per lb., for 7 lb. lots.
ZINC SULPHIDE.—About £63 per ton ex works.

Plus 5% War Charge.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—Per ton in 6-ton lots d/d farmer's nearest station up to January 31, 1940, £9; February, £9 3s.; March/June, £9 6s.
CALCIUM CYANAMIDE.—£12 10s. for 5-ton lots per ton net f.o.r. or ex store, London. Supplies small.
"NITRO-CHALK."—£8 18s. per ton, in 6-ton lots, d/d farmer's nearest station, January/June delivery.
CONCENTRATED COMPLETE FERTILISERS.—£11 18s. to £12 4s. per ton in 6-ton lots, d/d farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£11 14s. to £16 6s. per ton in 6-ton lots, d/d farmer's nearest station.

Coal Tar Products

BENZOL.—Industrial (containing less than 2% of toluol), 2s. to 2s. 1d. per gal., ex works, nominal.
CARBOLIC ACID.—Crystals, 9d. to 11d. per lb.; Crude, 60's, 3s. 3d. to 3s. 6d., according to specification. MANCHESTER: Crystals, 1s. to 1s. 1d. per lb., d/d; crude, 3s. 9d. to 4s.; naked, at works.
CREOSOTE.—Home trade, 5d. per gal., f.o.r., makers' works; exports 6d. to 6¼d. per gal., according to grade. MANCHESTER: 4¾d. to 6¾d.
CRESYLIC ACID.—99/100%, 2s. 11d. to 3s. 3d. per gal., according to specification. MANCHESTER: Pale, 99/100%, 3s.
NAPHTHA.—Solvent, 90/160°, 1s. 8d. to 1s. 9d. per gal.; solvent, 95/60°, 1s. 11d. to 2s., naked at works; heavy, 90/190°, 1s. 3d. to 1s. 5d. per gal., naked at works, according to quantity. MANCHESTER: 90/160°, 1s. 7½d. to 1s. 10½d. per gal.
NAPHTHALENE.—Crude, whizzed or hot pressed, £10 to £11 per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. MANCHESTER: Refined, £17 to £18.
PITCH.—Medium, soft, 35s. per ton, f.o.b MANCHESTER: 37s. 6d., f.o.b. East Coast.
PYRIDINE.—90/140°, 19s. to 20s. per gal.; 90/160°, 16s. to 18s. 6d.; 90/180°, 3s. 9d. to 4s. 6d. per gal., f.o.b. MANCHESTER: 17s. to 19s. 6d. per gal.
TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.
XYLOL.—Commercial, 2s. 7d. per gal.; pure, 2s. 9d. MANCHESTER: 2s. 11d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £8 to £8 10s. per ton; grey, £12 to £13 MANCHESTER: Grey, £14.
METHYL ACETONE.—40.50%, £42 per ton.
WOOD CREOSOTE.—Unrefined, 1s. to 1s. 3d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—3s. 7d. to 4s. per gal.; solvent, 4s. to 4s. 6d. per gal.
WOOD TAR.—£5 to £6 per ton, according to quality.

*Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—1s. 10d. per lb., for cwt. lots, net packages.
BENZIDINE, HCl.—2s. 7d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P (ex toluol).—1s. 11d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—8d. to 9d. per lb. in 1-ton lots.
p-CRESOL 34/35° C.—1s. 8d. to 1s. 9d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 7d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 11½d.
DIPHENYLAMINE.—Spot, 2s. 3d. per lb.; d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb. 100%, d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100%, d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.
o-NITRANILINE.—4s. 3½d. per lb.
m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 10d. to 2s. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.
p-TOLUIDINE.—2s. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—February 19.—For the period ending March 2, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £46 5s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £33. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £24; soya, £22; coconut and palm kernel, £22 10s. ROSIN, 25s. to 35s. per cwt., ex wharf, according to grade. TURPENTINE, 54s. 9d. per cwt., spot, American, including tax, ex wharf, barrels, and ex discount.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

O. ASHWORTH AND CO., LTD., Manchester, bleachers, dyers, etc. (M., 24/2/40.) Feb. 7, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank by way of transfer of a debenture dated July 1, 1938, in favour of Union Bank of Manchester, Ltd.; general charge. *Nil. Feb. 28, 1939.

Application for Discharge

ELLIS, JOHN ARCHIBALD DUNBAR SINCLAIR, wholesale chemist and perfumer, of 84-86 Regent Street, London, W.1, and of 175 King's Court, Ravenscourt Park, London, W.6. (A.F.D., 24/2/40.) Hearing, March 6, 1940, 10.30 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

Company News

United Steel Companies, Ltd., have announced an interim dividend of 2½ per cent., less tax.

Aspro, Ltd., have declared an interim dividend of 10 per cent., to be paid on March 6.

Unifloc Reagents, Ltd., chemical and chemical product manufacturers, etc., of 10 Adelaide Street, Swansea, have increased their nominal capital by the addition of £12,000, beyond the registered capital of £4,000. The additional capital is divided into 12,000 6 per cent. cumulative preference shares of £1.

International Paint and Compositions Co., Ltd., report that profits for 1939, subject to excess profits tax, totalled £208,823, compared with £161,099 for 1938, after making provision for all tax charges. The final ordinary dividend is repeated at 16 per cent., again making 20 per cent., less tax, for the year, the final payment being due on March 30.

The Anchor Chemical Co., Ltd., report a net profit of £58,003 for the year to November 30 (against £26,417 for 1937-38). After transferring £25,569 to taxation reserve, the directors propose to pay a final ordinary dividend of 15 per cent. (making 25 per cent. for the year, against 20 per cent.), to set aside £7,500 to create a war contingencies account, and to carry £8,369 forward (against £4,360).

New Companies Registered

E.C. Chemicals, Ltd. (359,024).—Private company. Capital £3,000 in £1 shares. To carry on the business of manufacturers of and dealers in chemicals, salts, acids, dyes, colours, pigments, varnishes, gums, glues, plastics, perfumes, drugs, etc. Subscribers: C. V. Rozier, "Hamilton," School Road, Ashford, Middlesex; Edwd. J. Crow. Solicitors: Theodore Goddard & Co., 10 Serjeant's Inn, E.C.4.

Eastern Magnesia Corporation, Ltd. (359,082).—Private company. Capital, £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturers and importers of and dealers in magnesia, magnesite, ores, metals, salts, acids, gases and chemicals, disinfectants, fertilisers, glues, gums, pigments, toilet requisites, etc. Directors: Walter J. Parry, Markham Mansfield. Solicitors: W. John Parry & Co., 4 Bryanston Street, W.1. Registered office: 4 Bryanston Street, W.1.

B.B. Technical (Raw Materials), Ltd. (358,767).—Private company. Capital £1,000 in £1 ordinary shares. To carry on the business of factors, exporters, importers and general merchants of and dealers in chemicals and chemical substances, minerals, fluorescent materials, etc. Subscribers: Geo. B. Winsor, Arthur Booker. Directors: Wm. D. Furniss, John P. Brennan and Arthur Booker. Solicitors: Furniss Wells and Co., 7 Princes Street, E.C.2. Registered office: 7-8 Princes Street, E.C.2.

Edwin Taylor (Chemicals), Ltd. (359,154).—Private company. Capital, £100 in 100 shares of £1 each. To carry on the business of manufacturers of chemical and technical products connected with the cleaning and antisepticising of interiors of buildings, hospitals, etc. Subscribers: Julius Lederer and Heinz Lederer. Directors: Edwin Taylor and Mrs. Pauline G. Taylor. Secretary: Heinz Lederer. Solicitors: Vaudrey, Osborne & Mellor, 30 St. Ann Street, Manchester. Registered office: 82 Boardman Street, Ardwick, Manchester.

Parzilla, Ltd. (358,966).—Private company. Capital £1,000 in 20,000 shares of 1s. each. To acquire, develop, exploit and turn to account certain processes, patents and provisional patents relating to a method or process for the manufacture of acid, heat and corrosion resisting alloys and processes relating thereto; and to carry on the business of ironfounders, steel makers, refiners, rollers, furnace proprietors, smelters, etc. Permanent directors: Denis Becker, Arthur Carter, Wm. J. Beardsley, Robert A. Nisbet, and Arundel Kempton. Secretary: Harold E. S. Newbury, 34/40 Ludgate Hill, E.C.4. Solicitors: H. B. Nisbet and Co., 47 Mecklenburgh Square, W.C.1.

Chemical Trade Inquiries

Holland.—A firm of agents established at The Hague wishes to obtain the representation of United Kingdom manufacturers of scientific and surgical instruments for Holland. (Ref. No. 84.)

Holland.—A firm of agents established at Leyden wishes to obtain the representation of United Kingdom manufacturers of scientific and surgical instruments for Holland. (Ref. No. 85.)

Chemical and Allied Stocks and Shares

ALTHOUGH the volume of business in most sections of the Stock Exchange was slightly below the level of a week ago, the undertone was firm, and movements in values were mostly in favour of holders. Securities of chemical and kindred companies reflected the general trend.

Imperial Chemical continued to attract attention on hopes that the dividend may be kept on an 8 per cent. basis, and at 31s. 9d. were 6d. higher on balance, while the preference units at 32s. 4½d. were virtually the same as a week ago. Fison Packard held last week's rise to 38s. 1½d., and Borax Consolidated deferred units have been active around 24s. 9d.xd., at which an apparently attractive yield is given on the basis of last year's maintained dividend of 7½ per cent. The preference and preferred ordinary units of the last-named company also offer favourable yields, and are regarded in the market as somewhat undervalued, the assumption being that the outlook for the company is favourable because of the many uses of its product, and its important business interests in America. British Match remained a steady feature around 33s. 6d., while B. Laporte were firmly held and continued to be quoted at slightly over 60s. Low Temperature Carbonisation 2s. ordinary units improved and were dealt in around par, following the progress statement recently issued by the directors.

Bradford Dyers responded to the good impression created by the improved earnings shown for the past year, and changed hands around 6s. 9d. British Cotton and Wool Dyers and other leading textile shares were better on balance, and Courtaulds remained active in front of the dividend announcement. Various iron and steel shares showed further moderate gains, including United Steel and Baldwins, while Guest Keen changed hands up to 26s. Although the market is not expecting higher distributions from iron and steel manufacturers, the general assumption is that dividend rates are likely to be maintained in many cases, and it is being pointed out that yields at current prices compare favourably with the return on most industrial securities.

British Aluminium were steady at 49s. 6d., and British Oxygen were around 71s. 3d. British Ropes were slightly higher at 10s. 9d. awaiting the financial results, due shortly. Dunlop Rubber continued to fluctuate, pending the dividend announcement, but at 31s. 7½d. were higher on balance. Barry and Staines failed to keep best prices touched during the past few days, but at 31s. were unchanged as compared with a week ago, while Michael Nairn were higher at 55s. 7½d. United Molasses moved up to 26s. pending the next dividend payment, while Wall Paper Manufacturers' deferred units were firmer at 15s. 6d. following their recent decline. International Paint were higher at 77s. 6d. on the financial results and the maintenance of the dividend, while Pinchin Johnson further improved to 21s. 3d.

Lever and Unilever were maintained at 29s. and British Oil and Cake Mills preferred ordinary shares were again around 39s. United Premier Oil and Cake were 6d. higher at 8s. 6d., but Valor ordinary reacted from 26s. 3d. to 25s. 6d. Blythe Colour 4s. ordinary shares improved further from 7s. 6d. to 7s. 9d., but British Drug Houses reacted from 25s. to 23s. 9d. Goodlass Wall rallied from 9s. 6d. to 10s., and Imperial Smelting were firmer at 12s. 4½d., while British Lead Mills remained at 2s. 6d., although "ex" the dividend.

Boots Drug transferred around 42s., and Timothy Whites around 25s. Higher prices ruled for Cerebos and Reckitt and Sons ordinary shares; the last-named moved up from 100s. to 101s. 3d. Oil shares showed no very decided trend, but "Shell" and Trinidad Leaseholds were better on balance for the week.